

Verification and Certification report

for

GS programme of activities

Nepal Biogas Support Program-PoA

Verification period:
01/08/2018 to 30/01/2020

Submitted by:



Verification and certification report form for programme of activities
(Version 03.0)

Complete this form in accordance with the instructions attached at the end of this form.

BASIC INFORMATION

Title and UNFCCC reference number of the programme of activities (PoA)	Nepal Biogas Support Program-PoA	
	CDM ref no: 9572	PoA GS ref no: 3110
	CPA 9572-0001	CPA GS ref no: GS 3109
	CPA 9572-0002	CPA GS ref no: GS 3113
	CPA 9572-0003	CPA GS ref no: GS 3114
	CPA 9572-0004	CPA GS ref no: GS 3116
	CPA 9572-0005	CPA GS ref no: GS 3566
	CPA 9572-0006	CPA GS ref no: GS 6393
	CPA 9572-0007	CPA GS ref no: GS 6394
	CPA 9572-0008	CPA GS ref no: GS 7508
CPA 9572-0009	CPA GS ref no: GS 7509	
Version number(s) of the PoA-DD(s) to which this report applies	14.0	
Version number of the verification and certification report	2.1	
Completion date of the verification and certification report	26/06/2020	
Monitoring period number and duration of this monitoring period	Monitoring period number: 06 for the PoA Regular verification (CPA-1 to CPA-9): 01/08/2018 to 30/01/2020 Retroactive labelling (CPA-8): 23/09/2017 to 31/7/2018	
Number and version number of the monitoring report to which this report applies	04	
Coordinating/managing entity (CME)	Alternative Energy Promotion Centre (AEPC)	
Host Parties	Host Parties of the PoA	Is this a host Party to a CPA covered in this report? (yes/no)
	Nepal	Yes
Applied methodologies and standardized baselines	AMS.I.E. Switch from Non-Renewable Biomass for Thermal Applications by the User (version 04)	
Mandatory sectoral scopes	Sectoral Scope 1: Energy Industries (renewable/non-renewable sources)	
Conditional sectoral scopes, if applicable	NA	
Estimated amount of GHG emission reductions or GHG removals for this monitoring period in the included CPAs covered in this report	867,831 tCO _{2e}	
Certified amount of GHG emission reductions or GHG removals for this	For regular verification (CPA 1 to 9): 725,885 tCO _{2eq} Fore Retroactive labelling (CPA-8): 42,350 tCO _{2eq}	

monitoring period for the included CPAs covered in this report	Total: 768,235 tCO _{2eq}
Name and UNFCCC reference number of the DOE	EPIC Sustainability Services Private Limited (E-0062)
Name, position and signature of the approver of the verification and certification report	 K.Suryanarayana Murthy, Managing Director

SECTION A. Executive summary

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EPIC Sustainability Services Private Limited (EPIC) has been contracted by Alternative Energy Promotion Centre (AEPIC) to undertake the sixth periodic independent verification of the registered GS programme of activity titled “Nepal Biogas Support Program-PoA” (GS PoA ref no: 3110, UNFCCC reference number: 9572), covering 1 to 9 CPA's. The objectives of this verification are to verify and certify emission reductions reported for project activity for the monitoring period of 01/08/2018 to 30/01/2020 (first and last day included); and to verify that the data reported are complete and transparent.

This report summarizes the findings of the verification of the project, performed on the basis of UNFCCC criteria for CDM, as well as criteria given to provide for consistent project operations, monitoring and reporting. UNFCCC criteria refer to the Kyoto Protocol, the CDM rules and modalities as agreed in the Bonn Agreement, the Marrakech Accords and the CDM Executive Board's decisions. The verification team based on the recommendations in the Validation and Verification Standard version 2.0^{/1/}, Gold Standard for Global Goals (GS4GG)^{/2/}, GS Principles and Requirements v1.2^{/2/}, GS Activity Requirements v1.2^{/2/}, GS Product Requirements v1.2^{/2/}, relevant GS annexes and employed a risk-based approach in the verification, focusing on the identification of significant risks and reliability of project monitoring and generations of GS-CERs.

The verification is not meant to provide any consulting towards the client. However, stated request for clarifications and/or corrective actions may provide input for improvement of the project design. The scope of the verification is the independent and objective review and ex-post determination of the monitored reductions in GHG emission by the project activity. The verification is based on the CDM plus GS validated and approved project design document PoA-DD^{/3/} (hereinafter referred to as PoA-DD), corresponding validation report^{/4/}, CPA-DD's (CPA 1 to CPA 9)^{/5/}, corresponding validation report^{/6/}, previous monitoring reports and its corresponding verification reports^{/7/}. These documents were reviewed against the requirements of the Kyoto Protocol, the CDM Modalities and Procedures and related rules and guidance.

The PoA involves the implementation of biogas applications at individual households in Nepal. The programme of activities reduces GHG emissions due to displacing firewood by biogas from animal waste and human excreta. Only the replacement of non-renewable biomass is counted as emission reduction under CDM/GS for this project. This verification covers CPA-1, CPA-2, CPA-3, CPA-4, CPA-5, CPA-6, CPA-7, CPA-8 and CPA-9. Target group under the Biogas Support Program (BSP) are rural households who currently use non-renewable biomass (firewood). The BSP is centrally managed by Alternative Energy Promotion Centre (AEPIC) with the support of Biogas Sector Partnership Nepal (BSP-NEPAL), the implementing agency of the AEPIC. AEPIC is a public entity that executes all renewable/alternative energy programmes in Nepal including this PoA.

Before this monitoring period, 5 periodic verifications were completed already. The VPA wise monitoring and verification completed with the corresponding monitoring numbers are shown in following table:

CPA number	GS labelling of CERs (Number)						Total GS labelling completed
	MP-1	MP-2	MP-3	MP-4	MP-5	MP-6	
CPA-1	61789	65725	59679	49928	62122	Ongoing	299243
CPA-2	14992	63426	62812	55115	57023	Ongoing	253368
CPA-3	14465	62105	55716	55112	55909	Ongoing	243307
CPA-4	15235	61126	56674	58433	50986	Ongoing	242454
CPA-5	N/A	N/A	N/A	37361	48099	Ongoing	85460
CPA-6	N/A	N/A	N/A	31711	46885	Ongoing	78596
CPA-7	N/A	N/A	N/A	34788	47330	Ongoing	82118
CPA-8	N/A	N/A	N/A	N/A	Ongoing	Ongoing	0
CPA-9	N/A	N/A	N/A	N/A	N/A	Ongoing	0
Total	106481	252382	234881	322448	368354	Ongoing	1284546

As per the table above, until now PoA is undergone GS verification and monitoring for the monitoring period 5 (MP-5) and now verification is ongoing for monitoring period number 6. However, the monitoring period for different CPAs are different. CPA-1, CPA-2, CPA-3 and CPA-4 completed its monitoring period number 5 and current verification is for the monitoring period number 6. For CPA-5, CPA-6 and CPA-7, monitoring period number 1 (MP-1) and monitoring period number 2 (MP-2) are

completed and the current verification is for monitoring period 3 for those CPAs. For CPA-8, current verification and labelling covers the monitoring period 1 (MP-1) and monitoring period number 2 (MP-2). For CPA-9, this verification is for monitoring period 1 (MP-1) for that particular CPAs. Until now, 1,284,546 CERs are GS labelled for this PoA.

The verification team determines the conformity of the actual project activity and its operation with the registered PoA-DD and CPA-DDs. The verification team has, by means of a desk review and an on-site visit, assessed that all physical features of the proposed CDM programme of activity are in place, and that the project participants have operated the CDM project activity as per the PoA-DD and the CPA-DD. Thus the verification team has concluded that the project activity was implemented and operated as per PDD, and that all physical features of the project are in place and comply with para 270 to 273 of VVS.

The verification team, based on the site visit and document review, was able to conclude that the project activity has been implemented as per the PoA-DD and the CPA-DDs. The start date of this monitoring period is 01/08/2018 which is in line with the end date of the previous monitoring period. The monitoring report for this monitoring period is in compliance with the monitoring plan of the PoA-DD and the CPA-DD. The project activity was registered by applying the small scale methodology AMS.I.E version 4.0 and the verification was carried out in accordance with the applied methodology. It was confirmed during the site visit that the project activity during the current periodic verification is in accordance with the applicability criteria of the methodology. It is the responsibility of EPIC to express an independent GHG verification opinion on the GHG emissions reductions and on the calculation of GHG emission reductions from the project for this monitoring period based on the reported emission reduction in the monitoring Report.

EPIC's verification approach was based on the requirements as defined under the Kyoto Protocol, Marrakech accord, as well as those defined by the CDM Executive board and Gold standard. EPIC's approach was risk-based, drawing on an understanding of the risks associated with reported GHG emissions data and the controls in place to mitigate these. The examination includes assessment of evidence relevant to the amounts and disclosures in relation to the project's GHG emission reductions for this monitoring period. The verification team has planned and performed the work to obtain the information and explanations that is considered necessary to provide sufficient evidence for it to give reasonable assurance that the amount of calculated GHG emission reductions for this monitoring period were fairly stated.

SECTION B. Verification team, technical reviewer and approver

B.1. Verification team members

No.	Role	Type of resource	Last name	First name	Affiliation (e.g. name of central or other office of DOE or outsourced entity)	Involvement in			
						Desk/document review	On-site inspection	Interview(s)	Verification findings
1.	Team Leader	IR	D	Siddaramu	EPIC, Central office, Bangalore	√	√	√	√
2.	Technical Expert	ER	Sujan	Adhikari		√	√	√	√

B.2. Technical reviewer and approver of the verification and certification report

No.	Role	Type of resource	Last name	First name	Affiliation (e.g. name of central or other office of DOE or outsourced entity)
1.	Technical reviewer	IR	Vijayaraghavan	Radhamadhavan	EPIC, Central office, Bangalore

SECTION C. Application of materiality in conducting the verification

C.1. Consideration of materiality in planning the verification

No.	Risk that could lead to material errors, omissions or misstatements	Assessment of the risk		Response to the risk in the verification plan and/or sampling plan
		Risk level	Justification	
1.	Errors in manual transfer of records from handwritten information to excel spread sheets (including misstatements & omissions)	Medium	Likely human error during data transfer and ineffective QA/QC procedures	During document review and on-site visit, complete review of the data transfer process and the cross-check mechanism followed by the PP needs to be checked
2	Operational percentage of digesters for each of the 9 CPA's under monitoring	Medium	Monitoring process is not complicated, but involvement of untrained personnel for BUS survey may give erroneous data	Following will be checked:- ➤ Survey procedures ➤ Selection of survey personnel ➤ Trainings provided to the survey personnel (training modules, attendance sheet etc.) ➤ Cross check of BUS reports information with actual site data

C.2. Consideration of materiality in conducting the verification

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In line with Guidelines for Application of materiality in verification, a reasonable level of assurance is defined for the verification of the project by complete verification of all the values indicated in the emission reduction spread sheet and the referred documents, at the document review stage and onsite visit

Parameter	Verification approach	Error identified	Findings reference	Correction	Extrapolated error for population size (Qty and %)
P - The share of digesters operational, “%”	Acceptance sampling	Yes	CAR Applicable	No	Impact (Materiality threshold not exceeded)

The identified/selected materiality threshold for the PoA under current monitoring period is 5% as PoA is small scale in accordance with para 308 of CDM VVS for PoA, Version 2.0. As per the on-site verification audit plan, visits to households were planned between 26/02/2020 to 05/03/2020. However, due to a strike called (<https://ekantipur.com/news/2020/03/03/158322344593125624.html>), the last two days site visit was cancelled and these households were interviewed over phone on 04/03/2019. Apart from this deviation from the audit plan, no major revision to the overall plan.

SECTION D. Means of verification

D.1. Desk/document review

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The verification was performed primarily based on the review of the monitoring report^{8/}, PoA-DD, CPA-DDs, its corresponding validation reports and the supporting documentation. This process included review of data and information presented to verify their completeness and review of the monitoring plan and monitoring methodology, paying particular attention to the frequency of measurements, and the QA/QC procedures, and an evaluation of data management and the QA/QC system in the context of their influence on the generation and reporting of emission reduction. The monitoring report version01 (hereinafter referred to as initial MR) submitted by the project participant and additional background documents related to the emission reductions are reviewed as an initial step of the verification process. The subsequent step involved the identification of corrective action requests and clarification requests (CAR and CL) which are presented in Appendix 4 of this report. A complete list of all documents and records reviewed is as attached in Appendix 3 of this report.

D.2. On-site inspection

Duration of on-site inspection: 26/02/2020 to 05/03/2020				
No.	Activity performed on-site	Site location	Date	Team member
1.	The verification team conducted visits to the project site to confirm the information and to resolve issues identified in the document review. An on-site assessment was conducted as a part of verification activity and involved: ➤ an assessment of the implementation and operation of the CDM programme of activity as per the PoA-DD and the CPA-DD's ➤ a review of information flows for generating, aggregating and reporting of the monitoring parameters ➤ interviews with relevant personnel to confirm that the operational and data collection procedures are implemented in accordance with the Monitoring Plan ➤ a cross-check between information provided in the MR and data from other sources ➤ a check of the monitoring equipment including calibration performance, and observations of monitoring practices against the requirements of the PoA-DD and the applied methodology ➤ a review of calculations and assumptions made in determining the GHG data and ERs, and ➤ an identification of QA/QC procedures in place to prevent, or identify and correct, any errors or omissions in the reported monitoring parameters.	Digestors in localities of Dhading, Lamjung, Tanahun, Palpa, Kaski, Rupandehi, Nawalparasi, Chitwan, Darchula and Sankhuwasabha districts of Nepal covering Hill, Terai and Remote Hill regions	26/02/2020 to 05/03/2020	Dr D Siddaramu and Mr Sujan Adhikari

D.3. Interviews

No.	Interviewee			Date	Subject	Team member
	Last name	First name	Affiliation			
1.	Pokhrel	Prem Kumar	Climate and Carbon Financing Expert, AEPC	26/02/2020 - 05/03/2020	Performance of project activity - Project Implementation MR, CER sheets, Sampling, Monitoring, Data management and reporting, QA/QC systems, logistics, interactions with Biogas end users and Biogas companies, Internal quality, Documentation, Record keeping, Customer complaints	Dr.D.Siddaramu and Mr.Sujan Adhikari
2.	Dhakal	Nawa Raj	Director, AEPC	05/03/2020	Performance of	

3.	Laudari	Raju	Assistant Director, AEPC		project activity - Project Implementation, correctness of data captured in the Monitoring, Data management and reporting, QA/QC – Subsidy check list, double counting etc	
4.	Thapa	Rana Bahadur	Sr. Officer, AEPC			
5.	Ghimire	Mukesh	Sr. Officer, , AEPC			
6.	Thapa	Lawa Kumar	Socio-economist, AEPC			
7.	Khanal	Ishwar Chandra	Planning Officer, AEPC			
8.	10 Biogas companies ¹		Biogas digestors implementation Companies	26/02/2020 - 05/03/2020	Construction, Agreements, complaint management, Repairs, User trainings, spares availability, interactions with the end users, scheduled inspections	
9.	Neupane	Bibek Kanta	Sustainable Energy and Technology Management P. Ltd. (SETM) Kathmandu, Nepal	05/03/2020	Modalities of user survey carried out, training to enumerators etc	
Biogas households						

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1. Bageshwori Gobargas Company Pvt.Ltd. (BGG)
2. Bhrikuti Gobargas Company Pvt. Ltd. (BRI)
3. Dipsikha Urja Bikas Company Pvt. Ltd. (DUV)
4. Gandaki Gobargas Company Pvt. Ltd. (GGK)
5. Himal Energy Development Pvt. Ltd. (HED)
6. Janta Urja Bikas Company Pvt. Ltd. (JGG)
7. Marsyangdi Gobargas तथा Urja Bikas Pvt. Ltd. (MUC)
8. Public Biogas तथा Urja Bikas Company Pvt. Ltd. (PGC)
9. Pragati Bioenergy Pvt. Ltd. (PGG)
10. Rastriya Gobargas Nirman Tatha Sewa Pvt. Ltd. (RGG)

10.	Rudra bdr. Magar	Dhading	26/02/2020 - 03/03/2020 (During onsite visit)	Status of Biogas digester operation and its usage, operation and maintenance, and availability of trained personnel, down times, (if any), reasons for non-usage, cattle availability, fuels used for cooking, no of persons in house, spares availability etc	Dr.D.Siddaramu and Mr.Sujan Adhikari
11	Tilak bdr. Laupa Magar	Dhading			
12	Bal Kumari Patamagar	Dhading			
13	Gunmaya Silwal	Dhading			
14	Indra Bdr Thapa Magar	Rupandehi			
15	Ganga Br Pun	Rupandehi			
16	Rajendra pd. Tiwari	Kaski			
17	Som bdr. Khanal chhetri	Kaski			
18	Kalyan Gurung	Kaski			
19	Bijaya Sapkota	Kaski			
20	Mohan Bdr Bimali	Kaski			
21	Yam Maya Gurung	Kaski			
22	Sitaram Kadariya	Chitwan			
23	Ambika Tamang	Chitwan			
24	Puja Kunwar	Chitwan			
25	Shanti Kumari Thapa	Chitwan			
26	Shakti Ballav Bhusal	Chitwan			
27	Man Kumari Thapa	Chitwan			
28	Hathana Mahato	Chitwan			
29	Mina Sapkota	Chitwan			
30	Resham Lal Puri	Chitwan			
31	Chandra Bahadur Thapa Chhetri	Chitwan			
32	Thir Maya Gauli	Lamjung			
33	Sabitri Adhikari	Lamjung			
34	Sita Gauli	Lamjung			
35	Bishal Sharma	Rupandehi			
36	Hira Lal Pun Magar	Rupandehi			
37	Sunita Sinjali	Rupandehi			
38	Umanath Sharma	Rupandehi			
39	Bhadra Bahadur Thapa Magar	Rupandehi			
40	Padam Bahadur Thapa	Rupandehi			
41	Krishna Kumari Kandel	Tanahu			
42	Om Bdr Ale	Tanahu			
43	Srimaya Malla	Tanahu			
44	Bihi Sara Ale Magar	Tanahu			
45	Parbati Rana	Nawalparasi			
46	Radi Saru Magar	Nawalparasi			
47	Shanti Sai	Nawalparasi			
48	Purni Sara Gharti Magar	Nawalparasi			
49	Tuma Karki	Tanahu			
50	Kumari Gharti	Tanahu			
51	Tika Maya Rana	Tanahu			
52	Purna Kumari Malla	Tanahu			
53	Gumi Rai Magar	Nawalparasi			
54	Pan Maya Kumal	Lamjung			
55	Buddhimaya Kumal	Lamjung			
56	Indra Bahadur Kumal	Lamjung			
57	Samjhana Kumal	Lamjung			
58	Budhhi Maya Kafle	Nawalparasi			
59	Renuka Devi Kafle	Nawalparasi			
60	Tika Ram Bishwokarma	Lamjung			
61	Dhan bdr. Bhujel	Lamjung			
62	Phul Maya Bishwokarma	Lamjung			
63	Ambika Bhujel	Lamjung			
64	Sunita Bhujel	Lamjung			
65	Makar Bahadur Gurung	Lamjung			
66	Jit Bahadur Biswokarma	Lamjung			
67	Sukdev Bhandari	Lamjung			

68	Kasi Nath Jamarkattel	Lamjung			
69	Nanimaya bi. Ka	Dhading			
70	Nil Kumari Gauli	Lamjung			
71	Bhim Bdr Kaucha	Palpa			
72	Karna Purna Aale	Palpa			
73	Maniraj Magar	Palpa			
74	Maya Tarami Magar	Palpa			
75	Chij Maya Jamarkattel	Lamjung			
Households interviewed over telephone					
76	Bimala Thakuri	Chitwan	04/03/2020 (Telephonic interview)	Status of Biogas digester operation and its usage, operation and maintenance, and availability of trained personnel, down times, (if any), reasons for non-usage, cattle availability, fuels used for cooking, no of persons in house, spares availability etc	Dr.D.Siddaramu and Mr.Sujan Adhikari
77	Laxmi Chhetri	Chitwan			
78	Bir bdr. Shrestha	Chitwan			
79	Ganesh Kumari Thapa	Chitwan			
80	Sriram Poudel	Chitwan			
81	Thaneshwor Rimal	Nawalparasi			
82	Chandra Poudel	Nawalparasi			
83	Yamuna Kumari Pathak	Nawalparasi			
84	Parbati (Mahaseth) Devi	Nawalparasi			
85	Buddhi Siri Gurung	Nawalparasi			
86	Shushma Gurung	Nawalparasi			
87	Nari Maya Rakashakoti	Nawalparasi			
88	Man Bdr Bhujel	Lamjung			
89	Bishnu Maya Magar	Lamjung			
90	Bishnu Pd Pangeni	Nawalparasi			
91	Kamal Bdr Upadhyay	Nawalparasi			
92	Pampha Adhikari	Nawalparasi			
93	Mina K.C	Nawalparasi			
94	Lekhu Maya Upadhyay	Nawalparasi			
95	Tara Datta Joshi	Darchula			
96	Gaura Devi Joshi	Darchula			
97	Sundari Joshi	Darchula			
98	Raj Kumar Adhikari	Sankhuwasabha			
99	Mina Kumari Gurung	Lamjung			
100	Dhurba Kumar Nepal	PARSA			
101	Saraswoti Bhandari	PARSA			
102	Megh b. Pandey	PARSA			
103	Shyam b. Thing	PARSA			
104	Bishnu Kumari Bhandari	Parsa			
105	Tek Narayan Suvedi	Nawalparasi			
106	Tilak Prashad Rijal	Nawalparasi			
107	Tek Nath Sapkota	Nawalparasi			
108	Laxmi Poudel	Sankhuwasabha			
109	Chhabi Lal Khulal	Sankhuwasabha			
110	Radhika Bohara	Makwanpur			
111	Sumitra Aryal	Makwanpur			
112	Sobita Kumari Adhikari	Makwanpur			
113	Hari Sharan Aryal	Makwanpur			
114	Harka Bhadur Karki	Sankhuwasabha			
115	Surendra Karki	Sankhuwasabha			
116	Suman Kuamr Dangi	Sankhuwasabha			
Masons met					
117	Vikram Mahato	Chitwan	26/02/2020 - 03/03/2020 (During onsite visit)		Dr.D.Siddaramu and Mr.Sujan Adhikari
118	Suwarna Shakya	Dhading			
119	Lut Bahadur Rana	Dhading			
120	Dil Bahadur Poudel	Makwanpur			
121	Kedar Thakuri	Kavre			
122	Lok Bikram Saha	Kavre			
123	Lila Bahadur Shrestha	Dhading			

D.4. Sampling approach

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The verification team used acceptance sampling approach for checking the operational status of the biodigestors. A sample size of 61 was required, based on an AQL of 0.5% and UQL of 0.5%, the producer risk used is 5% and consumer risk used was 5%. In accordance with the para table on page no.11 of "Sampling and surveys for CDM project activities and programmes of activities", version 07.0^{9/} However, the verification team visited 66 households (and an additional 10 non-sampled households) in localities of Dhading, Lamjung, Tanahun, Palpa, Kaski, Rupandehi, Nawalparasi, Chitwan, Darchula and Sankhuwasabha districts of Nepal covering Hill, Terai and Remote Hill regions. It was observed that 01 HH (i.e., PGG10220-Sunita Bhujel, Lamjung) was not working during the visit) and all other i.e., 60 were working in good condition and no discrepant records were observed with the published MR and survey sample records. Apart from this an additional of 41 HH's were contacted through phone and found working in good condition except 01 HH (i.e., HED01812 - Ambika Tamang, Chitwan) and no discrepant records were observed with the published MR and survey sample records. Thus PP's set of records has been accepted. Refer Appendix 5 for HH's and CPA details.

D.5. Clarification requests, corrective action requests and forward action requests raised

Areas of verification findings	No. of CL	No. of CAR	No. of FAR
General			
Compliance of the monitoring report with the monitoring report form	-	-	-
Remaining forward action requests from validation and/or previous verifications	-	-	FAR01 and FAR02
CPAs considered for verification and covered in this report	-	-	-
Programme of activities			
Compliance of the programme implementation with the registered PoA-DD	-	-	-
Implementation and operation of the management system	-	-	-
Post-registration changes	-	-	-
• Corrections	-	-	-
• Inclusion of a monitoring plan	-	-	-
• Permanent changes to the registered monitoring plan, or permanent deviation of monitoring from the applied methodologies, standardized baselines, or other methodological regulatory documents ²	-	-	-
• Changes to the programme design	-	-	-
• Addition of CPA inclusion template	-	-	-
• Change of coordinating/managing entity	-	-	-
• Changes specific to afforestation and reforestation activities	-	-	-
Component project activities			
Compliance of the CPA implementation with the included CPA design document	-	-	-
Post-registration changes	-	-	-
• Temporary deviations from registered monitoring plan, applied methodologies, standardized baselines or other methodological regulatory documents	-	-	-
• Corrections	-	-	-
• Changes to the start date-of the crediting period	-	-	-
• Inclusion of a monitoring plan	-	-	-

² Other standards, methodologies, methodological tools and guidelines (to be) applied in accordance with the applied (selected) methodologies are collectively referred to as the other (applied) methodological regulatory documents).

• Permanent changes to the registered monitoring plan, or permanent deviation of monitoring from the applied methodologies, standardized baselines, or other methodological regulatory documents	-	-	-
• Changes to the project design	-	-	-
• Changes specific to afforestation and reforestation activities	-	-	-
Compliance of the registered monitoring plan with applied methodologies and standardized baselines	-	-	-
Compliance of monitoring activities with the registered monitoring plan	-	-	-
• Data and parameters fixed ex ante or at renewal of crediting period	-	-	-
• Data and parameters monitored	-	-	-
• Implementation of sampling plan	-	-	-
Compliance with the calibration frequency requirements for measuring instruments	-	-	-
Assessment of data and calculation of emission reductions or net removals	-	-	-
• Calculation of baseline GHG emissions or baseline net GHG removals by sinks	-	-	-
• Calculation of project GHG emissions or actual net GHG removals by sinks	CL03	-	-
• Calculation of leakage GHG emissions	-	-	-
• Summary of calculation of GHG emission reductions or net GHG removals by sinks	-	-	-
• Comparison of actual GHG emission reductions or net GHG removals by sinks with estimates in included CPA	CL09	-	-
• Remarks on difference from estimated value in included CPA	-	-	-
Assessment of reported sustainable development co-benefits	-	-	-
Global stakeholder consultation	-	-	-
Others (please specify)			
1. Operational and Non-operational biodigestors	CL01, CL02	-	-
2. Double counting	CL04	-	-
3. QA/QC procedures	CL05	-	-
4. User survey and Survey questionnaires	CL06, CL08 and CL10	-	-
5. Operational percentage of biogas digestors	CL07	-	-
6. Records/documents for verification	-	CAR01 and CAR02	-
7. Grievance addressable mechanism	CL11		
Total	11	02	02

SECTION E. Verification findings

E.1. General

E.1.1. Compliance of the monitoring report with the monitoring report form

Means of verification	As per GS requirement, the verification team has determined whether the monitoring report was completed using the valid version of the applicable monitoring report form. The verification team has checked whether all the sections of the monitoring report follows the guidelines provided in the template itself.
Findings	There is no CAR/CL raised in this section.
Conclusion	PP has used the GS4GG MR template, Version 1.0/ ¹⁰ , for the current MR period. The verification team has concluded that the monitoring report is

	complete covering all the relevant sections meeting the verification requirement.
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E.1.2. Remaining forward action requests from validation and/or previous verifications

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This is the sixth verification and the verification team has reviewed the validation report and previous verification reports and observed that there is 02 open issues i.e., 02 FARs from the fifth verification. Verification team has not raised any FARs during this verification process.

E.1.3. CPAs considered for verification and covered in this report

Reference number of the specific-case CPA (GS) included in the GS PoA (3110) as of the end of this monitoring period	Is the CPA considered for this verification? (yes/no)	Version number of the registered PoA-DD to which the specific-case CPA complies with	Confirmation that a request for issuance including the CPA has been published for the previous monitoring period (Y/N)
3109	Yes	Rev.14 dated 13/01/2013	Y
3113	Yes		Y
3114	Yes		Y
3116	Yes		Y
3566	Yes		Y
6393	Yes		Y
6394	Yes		Y
7508	Yes		N
7509	Yes		N

Note: The PoA got transition to GS4GG on 01/08/2018. The date of design certification are provided in brackets for the respective CPAs: CPA-1 (14/08/2015); CPA 2 (14/08/2015); CPA-3 (14/08/2015); CPA-4 (14/08/2015); CPA-5 (24/12/2018); CPA-6 (24/12/2018); CPA-7 (24/12/2018) and CPA-8 CPA-9 (23/09/2019).

E.2. Programme of activities

E.2.1. Compliance of the programme implementation with the registered programme design document

Means of verification	The verification team determined the conformity of the actual project activity and its operation with the registered project design document. EPIC has, by means of a desk review and an onsite visit, assessed that all physical features of the proposed CDM project activity proposed in the PoA-DD and CPA-DDs are in place, and that the PP/CME has operated the CDM project activity as per the registered PDD.
Findings	There is no CAR/CL raised in this section.
Conclusion	The verification team determines the conformity of the actual project activity and its operation with the approved project design document. The verification team has, by means of a desk review and an on-site visit, assessed that all physical features of the proposed CDM project activity proposed in the PoA-DD and CPA-DDs are in place, and that the project participants have operated the CDM project activity as per the PoA-DD and CPA-DDs. Biogas digestors are installed at various locations across Nepal. Technical details of digesters:- The technologies used in this CPAs are household biogas digesters with a sludge and gas holding capacity range of up to 10 m³. The different sizes of the digesters that are included in the programme are of 2, 4, 6, 8 and 10 m³. The programme uses only one uniform design i.e., GGC 2047 model across all the 9 CPAs, this is confirmed through physical inspections of the installed bio digesters, interview with the households and the technology suppliers. Further, the owner's name, size of the plant, installation date and its operational status, ID number, utilisation of other fuels in the house were verified through interview and visual observation. This information is also verified to be in line with the biogas user survey report. Detail of CPAs implemented under Nepal Biogas Support Program PoA covered in this MR period:-

Ref	CPA title	Number of Digesters	Construction Start Date	Construction End Date
9572-0001	Nepal Biogas Support Program- CPA 1: 20,000 digesters	20,000	22/06/2007	18/03/2009
9572-0002	Nepal Biogas Support Program – CPA 2: 19,927 digesters	19,927	19/03/2009	09/03/2010
9572-0003	Nepal Biogas Support Program – CPA 3: 19,959 digesters	19,959	10/03/2010	19/02/2011
9572-0004	Nepal Biogas Support Program – CPA 4: 19,970 digesters	19,970	20/02/2011	28/02/2012
9572-0005	Nepal Biogas Support Program – CPA 5: 19,842 digesters	19,842	29/02/2012	23/05/2013
9572-0006	Nepal Biogas Support Program – CPA 6: 18,504 digesters	18,504	24/05/2013	04/04/2014
9572-0007	Nepal Biogas Support Program – CPA 7: 18,392 digesters	18,392	05/04/2014	31/12/2014
9572-0008	Nepal Biogas Support Program – CPA 8: 19,445 digesters	19,445	01/01/2015	08/04/2016
9572-0009	Nepal Biogas Support Program - CPA 9: 17,304 digesters	17,304	09/04/2016	12/07/2018
Total		173,343		

Contract signed between BSP Nepal and AEPC^{11/} (as national service provider for installation of bio digesters in households across Nepal), database maintained by BSP Nepal (construction date information) and the construction progress report issued by BSP Nepal to AEPC were reviewed for the implementation of the bio-digesters.

Thus the verification team has concluded that the project activity was implemented and operated as per registered PoA-DD/CPA-DD's. The verification team, based on the site visit and document review, was able to conclude that the project activity has been implemented as per the PoA-DD/CPA-DD's and that all physical features of the project are in place.

E.2.2. Implementation and operation of the management system

Means of verification	The verification team carried out onsite visits for the CPAs and interviewed key personnel and several households (sampled and non-sampled). Interviewees included the CME, project developer and the company who takes care of maintenance activity. It was established that the programme management system has been implemented and operated as described in the registered PoA-DD and CPA-DDs.
Findings	There is no CAR/CL raised in this section.
Conclusion	Based on document review, interview of management personnel, stakeholder interview, on-site verification, the verification team confirms the implementation and operation of the management system included in the registered PoA-DD and CPA-DDs.

E.2.3. Post-registration changes

E.2.3.1. Corrections

>> There are no corrections in this monitoring period.

E.2.3.2. Inclusion of a monitoring plan

>> Not applicable

E.2.3.3. Permanent changes to the registered monitoring plan, or permanent deviation of monitoring from the applied methodologies, standardized baselines, or other methodological regulatory documents

>> Not applicable

E.2.3.4. Changes to the programme design

>> Not applicable

E.2.3.5. Addition of CPA inclusion template

>> Not applicable

E.2.3.6. Change of coordination/managing entity

>> Not applicable

E.2.3.7. Changes specific to afforestation and reforestation activities

>> Not applicable

E.3. Component project activities

E.3.1. Compliance of the CPA implementation with the included CPA design document

Means of verification	The verification team determined the conformity of the actual project activity and its operation with the registered project design document. The verification team has, by means of a desk review and an onsite visit, assessed that all physical features of the proposed CDM project activity proposed in the PoA-DD and CPA-DDs are in place, and that the project participants have operated the CDM project activity as per the PoA-DD.
Findings	There is no CAR/CL raised in this section.
Conclusion	The verification team determines the conformity of the actual project activity and its operation with the approved PoA-DD and CPA-DDs. CPA-1 to CPA-9 were also confirmed to be operational in accordance with the registered CPA-DDs. The verification team has, by means of a desk review and an on-site visit, assessed that all physical features of the proposed CDM project activity proposed in the PoA-DD and CPA-DDs are in place, and that the project participants have operated the CDM project activity as per the PoA-DD and CPA-DDs. Assessment of double counting: National Service Provider (NSP) registers all households that implement a digester under its BSP program, since the digester implementation, under the project, is done through subsidy scheme, BSP does not allow more than one digester to be implemented per household. Each digester implemented under the CPA is given a unique identification code (biogas digester code), the plant completion report also captures the GPS coordinates and the PoA database^{12/} captures the details of the digestors along with the geographical identification. The registration procedure of the BSP database does not allow double entries, and the system rejects if the same unique code is entered twice. This has been demonstrated by the CME to the verification team. BSP database is the basis for the disbursement of the subsidy and thus remains a credible source to check double counting of digesters. Moreover, all the digesters implemented under all CPAs of the PoA are centrally maintained by the CME, thus the possibility of double counting of the

	digesters between and within CPAs is checked. It is also conformed from CME that, all the biogas digestors that are implemented under subsidy programme comes under BSP only. The verification team has also checked the unique identity number engraved on the pipe of digesters, for all the digestors visited during the site visit and found it to be consistent with the data base maintained.
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E.3.2. Post-registration changes

E.3.2.1. Temporary deviations from the registered monitoring plan, applied methodologies, standardized baselines or other methodological regulatory documents

>> There is no temporary deviation for this monitoring period to the registered monitoring plan or applied methodology or any methodological regulatory documents in the PoA-DD and CPA-DDs.

E.3.2.2. Corrections

>> There are no corrections in this monitoring period, however during first periodic verification PRC correction related to information of distribution of biogas digesters across different ecological zones in CPA-1 was sought and the same was approved on 22nd June 2015. The total number of biogas plants included in CPA-1 for this crediting period is 20,000. However, one biogas which was found abandoned during last verification in Ilam district was not considered for ER calculation. So, total plants considered for the ER calculation for this monitoring period is 19,999.

E.3.2.3. Changes to the start-date of the crediting period

>> Not applicable

E.3.2.4. Inclusion of a monitoring plan

>> Not applicable

E.3.2.5. Permanent changes to the registered monitoring plan, or permanent deviation of monitoring from the applied methodologies, standardized baselines, or other methodological regulatory documents

>> Not applicable

E.3.2.6. Changes to the project design

>> Not applicable

E.3.2.7. Changes specific to afforestation and reforestation activities

>> Not applicable, as the project does not involve afforestation and reforestation activity

E.3.3. Compliance of the registered monitoring plan with applied methodologies and standardized baselines

Means of verification	The verification team determined whether the registered monitoring plan is in accordance with the applied methodology including applicable tools.
Findings	There is no CAR/CL raised in this section.
Conclusion	The verification team was able to confirm that the monitoring plan contained in the PDD is in accordance with the small scale methodology AMS.I.E version 4.0 ^{13/} and its applicable tools. The monitoring report for this monitoring period is in compliance with the monitoring plan of the PoA-DD/CPA-DD. The project activity was registered by applying the small scale methodology AMS.I.E version 4.0 and the verification was carried out in accordance with the applied methodology. It was confirmed during the site visit that the project activity during the current periodic verification is in accordance with the applicability criteria of the methodology.

E.3.4. Compliance of monitoring activities with the registered monitoring plan

E.3.4.1. Data and parameters fixed ex ante or at renewal of crediting period

Means of	The verification team has determined whether all ex-ante parameters used for
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verification	emission reduction calculation stated in the registered monitoring plan are used appropriately as per the registered PDD.																			
Findings	There is no CAR/CL raised in this section.																			
Conclusion	The following data and parameters fixed ex-ante were checked by the verification team to be in line with registered CPA-DD (for CPA-1, CPA-2, CPA-3, CPA-4, CPA-5, CPA-6, CPA-7, CPA-8 and CPA-9s): <table border="1"> <thead> <tr> <th>Parameter</th><th>Description</th><th>Value</th></tr> </thead> <tbody> <tr> <td>NCV_{biomass} TJ/tonne</td><td>Net calorific value of the non-renewable biomass that is substituted</td><td>0.0156 TJ/tonne, taken from IPCC^{/14/}</td></tr> <tr> <td>EF_{projected_fossil_fuel} tCO₂/TJ</td><td>Emission factor for the projected fossil fuel consumption in the baseline</td><td>81.6 tCO₂/TJ, taken from approved small scale methodology AMS I.E. (version 4.0)</td></tr> <tr> <td>f_{NRB,y} %</td><td>Fraction of biomass used in the absence of the project activity in year y that can be established as non-renewable biomass using nationally approved methods</td><td>86%, taken from "Default values of fraction of non-renewable biomass for Least Developed Countries and Small Island Developing States (version 01.0)" EB 67 Annex 22^{/15/}</td></tr> <tr> <td>Q_{NRBrep1} Tonne per year and appliance</td><td>Quantity of woody biomass that is substituted or displaced in tonnes per year and appliance</td><td>3.33 Calculated -As per paragraph 6 (a) of the methodology <i>B_y represents: The estimated average annual consumption of woody biomass per appliance (tonnes/year) derived from surveys or historic information.</i> -As per SSC WG clarification SSC 543 the estimate can be fixed ex-ante</td></tr> <tr> <td>N_{s,r} Numbers</td><td>Number of digesters in each size category (in m³) and region (Terai, Hill and, if available, Remote Hill or Mountain) implemented under the each CPAs</td><td>Taken from CPA database (BSP Database). The registration procedure of the BSP database avoids double counting of digesters and the registration of digesters that have not been commissioned. The BSP database is the basis for subsidy disbursement. The data used to maintain this database is gathered according to defined procedures, making it a reliable source of information.</td></tr> </tbody> </table>		Parameter	Description	Value	NCV_{biomass} TJ/tonne	Net calorific value of the non-renewable biomass that is substituted	0.0156 TJ/tonne, taken from IPCC ^{/14/}	EF_{projected_fossil_fuel} tCO ₂ /TJ	Emission factor for the projected fossil fuel consumption in the baseline	81.6 tCO ₂ /TJ, taken from approved small scale methodology AMS I.E. (version 4.0)	f_{NRB,y} %	Fraction of biomass used in the absence of the project activity in year y that can be established as non-renewable biomass using nationally approved methods	86%, taken from "Default values of fraction of non-renewable biomass for Least Developed Countries and Small Island Developing States (version 01.0)" EB 67 Annex 22 ^{/15/}	Q_{NRBrep1} Tonne per year and appliance	Quantity of woody biomass that is substituted or displaced in tonnes per year and appliance	3.33 Calculated -As per paragraph 6 (a) of the methodology <i>B_y represents: The estimated average annual consumption of woody biomass per appliance (tonnes/year) derived from surveys or historic information.</i> -As per SSC WG clarification SSC 543 the estimate can be fixed ex-ante	N_{s,r} Numbers	Number of digesters in each size category (in m ³) and region (Terai, Hill and, if available, Remote Hill or Mountain) implemented under the each CPAs	Taken from CPA database (BSP Database). The registration procedure of the BSP database avoids double counting of digesters and the registration of digesters that have not been commissioned. The BSP database is the basis for subsidy disbursement. The data used to maintain this database is gathered according to defined procedures, making it a reliable source of information.
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E.3.4.2. Data and parameters monitored

Means of verification	The verification team has determined whether the registered monitoring plan has been properly implemented and followed by the PP that the monitoring has been carried out in accordance with the registered monitoring plan.
Findings	There is no CAR/CL raised in this section.
Conclusion	As per the registered monitoring plan, "P" the share of digesters operational (based on the total number implemented using non-renewable biomass) is the only parameter that needs to be monitored. This parameter is the weighted average calculated value across all ecological zones obtained from annual biogas users survey ^{/16/} . Survey procedures adopted in determining the monitored value is verified to be as per the applicable standards and relevant

requirement. QA/QC procedures followed for the MR period is appropriate

CPA and its monitored value	Source
CPA1 - 75.71%	BUS Report 2018/19 ^{/16/} (i.e., 10 February - 05 April 2019 for CPA-1 to CPA-8 and between 20 May 2019 - 31 May 2019 for CPA-9)
CPA2 - 88.27%	
CPA3 - 80.22%	
CPA4 - 85.73%	
CPA5 - 93.86%	
CPA6 - 79.31%	
CPA7 - 81.76%	
CPA8 - 90.16%	
CPA9 - 95.55%	

As per the QA/QC procedure for the parameter detailed in the registered PoA-DD and CPA-DD's, "The Internal Quality Control system samples 5% of the digesters that are newly implemented, 2.5% of the digesters that are two year in operation and 2.5% of the digesters that have been operational for three years as part of the Internal Quality Control System". Survey of those households were conducted from 10 February - 05 April 2019 for CPA-1 to CPA-8 and between 20 May 2019 - 31 May 2019 for CPA-9. The enumerators were trained on structured questionnaire for 3 days. Enumerators were mobilized in a group of two persons. Having accumulated the data collected during the survey, the consultant analyzed the data using appropriate tools and prepared the "Biogas User Survey" report for individual CPAs.

Conclusion: Review of BUS (Biogas User Survey) reports confirms that the values are correct, and it is further confirmed that the same values are applied in the revised ER spread sheet (Version 2.0)^{/17/} and MR (Version 03)^{/18/}. As per the QA/QC procedure for the parameter detailed in the registered PoA-DD, the internal quality control system shall sample 5% of the digesters that are newly implemented, 2.5% of the digesters that are in operation for two years and 2.5% of the digesters that are in operation for three years. If, for the digesters listed in the CPA, the outcome of this survey is a lower percentage than the outcome of the operation report (as e.g. included to BUS), the lower of the two values is used. After the three years after sales service is over, this value will depend on the performance report or other monitoring reports. Since the After Sales Service (ASS) period of three years is already over for CPA-1, CPA-2, CPA-3, CPA-4, CPA-5, CPA-6, CPA-7, CPA-8 and CPA-9 the values of the emission reduction monitoring survey (BUS) has been taken for emission reduction calculation. It is confirmed by the verification team that the QA/QC procedures as defined in the registered PoA-DD/CPA-DD are compiled for this monitoring period. Further, the conformation of replacing non-renewable biomass was also detailed in the MR, whose information is sourced from the BUS survey. The verification team accepts the information provided related to replacement of non-renewable biomass, on-site visit and interaction with the households confirms the same.

The monitoring period for the all the 09 CPAs included in the PoA are from 3/08/2018 to 30/01/2020. As per CDM SSC 683, (<https://cdm.unfccc.int/methodologies/SSCmethodologies/clarifications/90438>) Where-in it is clarified that "Survey could be done at any point of time during the monitoring period which is also applicable for this PoA". Accordingly previous verifications and the issuance/labeling happened from verified VVB/GS. Therefore, the VVB hereby confirms that surveys are done in-line with the requirement (in between the monitoring period) and the given biogas user surveys are applicable for the given monitoring period respectively. Hence, for the retroactive labeling of CPA-8, the monitoring period applicable for the CERs issued is 1 August 2017 to 31 July 2018. The biogas user survey for the CPA-8 applicable for the retro-active labeling was done in February/March 2018 whereas for the monitoring period of 31 August 2018 to 30 January 2020, the biogas user survey was done in February/May 2019.

E.3.4.3. Implementation of sampling plan

Means of verification	The verification assessed whether the compliance of the sampling efforts and surveys with the registered sampling plan in accordance with the Guideline for sampling and surveys for CDM project activities and programme of activities ^{n/19/} version 4.0, if PP had applied a sampling approach to determine data and parameters monitored.
Findings	There is no CAR/CL raised in this section.
Conclusion	The parameter “P”, “the share of digesters operational (based on the total number implemented using non-renewable biomass)”, is determined through sampling. Ex-post Monitored parameter through survey mainly includes identification of non-operational biogas plants and assessment of Non Renewable source of biomass. The Biogas Users Survey (BUS) is carried out annually for each CPA, for the current MR period the survey is carried out for all the nine CPAs (01 to 09) Sample size was determined using stratified random sampling in consistent with the monitoring plan of the registered PoA-DD, respective CPA-DDs (01 to 09), and the Guidelines for sampling and surveys for CDM project activities and programme of activities. The sampling was performed within the level of precision of 10% and a confidence level of 90%. The verification team has reviewed the sampling approach through onsite visit interview and by the review of the methodology followed by the surveying entity (Sustainable Energy and Technology Management Pvt. Ltd (SETM)). The sampling method adopted in all the individual survey of the 9 CPA"s is verified to be in compliance with the guideline. The sample size is calculated using stratified random sampling technique and the resulting sample are proportionately distributed among various sizes of the biogas plant belonging to each of the three strata i.e., i) Hill, ii) Remote Hill and iii) Terai. First, the minimum sample required for each CPAs were calculated using the equation given in annex 4 of PoA-DD and then the samples were proportionately allocated for each stratum. a) Sample size calculation - Sample size was calculated using equation given in annex 4 of PoA-DD, the value of “p”, (the proportion of biogas digester expected to be operational) is taken from the observed operational status of biogas plants in remote hills, hills and Terai, in the previous biogas user survey for each CPA. However, to avoid non-response and answer bias, the sample size is enlarged to 135 for each CPA, instead of the required minimum. b) Allocation of samples - Samples are allocated in two different ways to maintain the representativeness within the CPA. First, samples are allocated proportionally to ecological belts and development regions 1 based on proportion of biogas installed in these two areas. Secondly, sample were allocated to size of biogas (i.e., 2, 4, 6, 8, 10 m³). First samples were proportionately allocated to the cluster and later the distribution of samples among different size of the digester was ensured. Samples allocated in each development regions and ecological belts is also almost equivalent to the proportion of Biogas plants installed in each regions and belts. c) Selection of districts and primary sampling units One district from each cluster from the ecological zone/development region matrix was selected randomly while selecting the districts. The sample is drawn randomly and distributed proportionately to the number of digester per ecological zones, regions, and digester size. While selecting the primary sampling unit and households the CME has used “randbetween” function in Excel. The verification team has reviewed the screenshots for the same for the conformance. The samples in the development regions, size of digesters are adjusted for the ease of the accessibility and data collection by the CME, but this has been kept in-line with the minimum sample required for the CPA and the minimum proportionate sample for each stratum (Remote Hill, Hill and Terai). For instance, minimum sample required for each stratum of the CPA-1 are calculated as 1, 38 and 46 respectively for Remote Hill, Hill and Terai (as reviewed from sample calculation sheet). Number of sample adjusted for Remote Hill, Hill and Terai are 4, 58 and 73

respectively which comply with the minimum required sample for each stratum as per PoA-DD.

Thus, it is confirmed by the verification team that the CME has applied stratified random sampling approach for the current monitoring period, and this is verified to be as per the applied monitoring methodology and the PoA/CPA-DD.

The verification team has reviewed the correctness of the samples in the BUS report by the independent agency "Sustainable Energy and Technology Management P. Ltd." (SETM) for all the 9 CPA's for the current MR period. It is confirmed that the survey has been carried out as per EB Guidelines for sampling and surveys for CDM project activities and programme of activities. The age, educational qualifications, prior experience in conducting similar survey's and training to the enumerators, questionnaire used in the survey were verified by the verification team.

CPA's	Total no of Biogas Plants installed	Weighted average operational status	Survey period	Samples surveyed
CPA-1	20,000	75.71%	10/02/2019 – 05/04/2019 for CPA-1 to CPA-8 and between 20/05/2019 – 31/05/2019 for CPA-9	135
CPA-2	19,927	88.27%		135
CPA-3	19,959	80.22%		135
CPA-4	19,970	85.73%		135
CPA-5	19,842	93.86%		135
CPA-6	18,504	79.31%		135
CPA-7	18,392	81.76%		135
CPA-8	19,445	90.16%		135
CPA-9	17304	95.55%		135

As per the registered CPA-DD's the CPA implementer has to conduct biennial monitoring but they have done annual monitoring and adequately considered 135 samples.

Reliability and precision calculation:

The verification team has verified the sample size calculation spread sheets with the monitored data, where the actual achieved precision is calculated against the guidelines outlined under "Standard for sampling and surveys for CDM project activities and programme of activities", and confirm that the calculation of achieved reliability was done correctly. The verification team confirmed from the sample size calculation spread sheet that the required precision was kept 10% during sample size calculation.

The section 3.1 of the BUS (Biogas User Survey) 2018-19 for each of the CPAs are checked and found that the sampling error calculated by the survey firm is less than 10% for all the CPAs, which is the acceptable as the PP took 90/10 confidence level.

CPA's	Precision achieved (%)	Is required precision achieved? (<10%)
CPA-1	8.1	Yes
CPA-2	5.1	Yes
CPA-3	7.0	Yes
CPA-4	5.5	Yes
CPA-5	3.6	Yes
CPA-6	7.2	Yes
CPA-7	6.3	Yes
CPA-8	4.5	Yes
CPA-9	3.0	Yes

From the above table, it is conformed that sampling was performed within the

	desired level of precision of 10% and a confidence level of 90%, for the monitored parameters, and therefore the survey results were directly used in the ER calculations. Thus the verification team concluded that the sampling requirements are adequately met and accepted the results as presented in the monitoring BUS reports. It is observed that, all the biogas digesters sold are registered under BSP Nepal database and their operational performance is monitored through field surveys of a random sample of the installed digesters in the households. The biogas production in the digester is not required to be metered. The number of digesters in operations is determined in terms of %, it is calculated by identifying the no of digesters that are operational against the no of digesters that are sold. This approach is verified to be as per the validated PoA-DD and CPA-DD's. The Masons training was conducted in local language i.e., Nepali (specially the training schedule and the questionnaire for pre-testing). The Attendance sheet and completion reports of the training were submitted for verification. The VVB checked the records and during site visit interviewed some of the Masons who had attended the training to confirm the reports.
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E.3.5. Compliance with the calibration frequency requirements for measuring instruments

Means of verification	Not applicable as there is no monitoring equipment involved as per the registered monitoring plan in the PoA-DD and CPA-DD
Findings	There is no CAR/CL raised in this section.
Conclusion	The project activity does not involve any monitoring instruments that require calibration; hence no further assessment is done.

E.3.6. Assessment of data and calculation of emission reductions or net removals

E.3.6.1. Calculation of baseline GHG emissions or baseline net GHG removals by sinks

Means of verification	The verification team assessed whether the data and calculations of baseline emission resulting from the registered PDD is correct. The verification team has checked whether calculations of baseline GHG emissions have been carried out in accordance with the formulae and methods described in the registered monitoring plan.
Findings	CL03 was raised in this section.
Conclusion	In line with AMS-I.E. version 04, para 04, the emission reductions for the project activity under a CPA are calculated as the following: $ER_y = B_y \cdot f_{NRB,y} \cdot NCV_{biomass} \cdot EF_{projected.fossilfuel}$ Where ER_y Emissions Reductions during the year y (tCO_{2e}) B_y Quantity of woody biomass that is substituted or displaced in tonnes $f_{NRB,y}$ Default value of fraction of non-renewable biomass for Nepal, (86% fixed ex-ante) $NCV_{biomass}$ Net calorific value of the non-renewable woody biomass that is substituted (IPCC default for wood fuel, 0.0156 TJ/tonne. (Updated IPCC value) $EF_{projected.fossilfuel}$ Emission factor for substitution of non-renewable woody biomass by similar consumers. Use a value of 81.6 tCO₂/TJ. (Fixed Ex-ante) Following option a) of paragraph 6, B_y is “calculated as the product of the number of appliances multiplied by the estimate of average annual consumption of woody biomass per appliance (tonnes/year)”. In the case of the present CPA, “the number of appliances” as deducted from the internal records (commissioning report / database) is corrected with the

	share of digesters actually in operation. The “average annual consumption of woody biomass per appliance (tonnes/year)” is the biomass substituted or displaced, which is fixed ex- ante at 3.33 tonnes/year per appliance. Thus, B_y is calculated as follows: $B_y = N_{sr} \times P \times Q_{NRB_{repl.}}$ Where N_{sr} The number of appliances. The parameter refers to the number of digesters in each size and category and is hence unitless. P Performance of digesters as the share of digesters implemented that is actually operational, determined through survey methods (%) $Q_{NRB_{repl.}}$ Average quantity of biomass replaced per appliance and year (tonnes/year) The emission reduction (without accounting leakage) for each CPA are: CPA-1: 82,870.80 tCO₂e CPA-2: 96,272.60 tCO₂e CPA-3: 87,634.63 tCO₂e CPA-4: 93,702.72 tCO₂e CPA-5: 1,01,935.45 tCO₂e CPA-6: 80,318.31 tCO₂e CPA-7: 82,301.41 tCO₂e CPA-8: 95,960.01 tCO₂e CPA-9: 43,098.57 tCO₂e For retroactive labelling of CPA 8 (Monitoring period: 23/09/2017-31/07/2018). Baseline emission calculated and approved by UNFCCC: 44,579.12 tCO_{2eq} The total no of digesters percentage that were non-operational as per the BUS survey for the year 2018/19, for all the 9 CPAs, (177 out of 1215 households surveyed, which works out to be 14.56%. The operational % observed by the verification team during the site visit is on the higher side, thus the value considered in each of the CPA's is deemed as conservative. Calculations, applied formulae and method for calculation of baseline emissions are in accordance with the registered monitoring plan and are in line with the requirements of the applied methodology. Further, the assessment of data and the calculation of baseline emission reduction in the MR and the CER excel sheet have been verified as per the set of supporting documents listed in Appendix 3. Hence, the verification team confirms that the baseline emissions for the current monitoring period calculated as 7,68,235 tCO₂ is in order.
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E.3.6.2. Calculation of project GHG emissions or actual net GHG removals by sinks

Means of verification	The verification team assessed whether the data and calculations of project emission resulting from the registered PDD is correct. The verification team has checked whether calculations of project GHG emissions have been carried out in accordance with the formulae and methods described in the registered monitoring plan.
Findings	There is no CAR/CL raised in this section.
Conclusion	Non consideration of project emission for the project activity is as per the monitoring plan of validated PoA-DD and CPA-DD's.

E.3.6.3. Calculation of leakage GHG emissions

Means of	The verification team assessed whether the data and calculations of leakage
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verification	emission resulting from the registered PDD is correct. The verification team has checked whether calculations of leakage GHG emissions have been carried out in accordance with the formulae and methods described in the registered monitoring plan.																								
Findings	There is no CAR/CL raised in this section.																								
Conclusion	The PP has adopted a leakage factor of 5% of the baseline emissions as per the adopted methodology. The verification team confirms that the value adopted and the calculations are in order. The respective leakage emission for each CPA is calculated as: <table border="1"> <thead> <tr> <th>CPA number</th><th>Leakage GHG emissions (tCO₂e)</th></tr> </thead> <tbody> <tr><td>CPA-1</td><td>4,143.54</td></tr> <tr><td>CPA-2</td><td>4,813.63</td></tr> <tr><td>CPA-3</td><td>4,381.73</td></tr> <tr><td>CPA-4</td><td>4,685.14</td></tr> <tr><td>CPA-5</td><td>5,096.77</td></tr> <tr><td>CPA-6</td><td>4,015.92</td></tr> <tr><td>CPA-7</td><td>4,115.07</td></tr> <tr><td>CPA-8</td><td>4,798.00</td></tr> <tr><td>CPA-9</td><td>2,154.93</td></tr> <tr><td>CPA-8 (Retroactive labelling)</td><td>2228.96</td></tr> <tr><td>Total</td><td>40,434</td></tr> </tbody> </table> Hence, the verification team confirms that the leakage emissions for the current monitoring period calculated as 40,434 tCO₂ is in order	CPA number	Leakage GHG emissions (tCO ₂ e)	CPA-1	4,143.54	CPA-2	4,813.63	CPA-3	4,381.73	CPA-4	4,685.14	CPA-5	5,096.77	CPA-6	4,015.92	CPA-7	4,115.07	CPA-8	4,798.00	CPA-9	2,154.93	CPA-8 (Retroactive labelling)	2228.96	Total	40,434
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CPA-9	2,154.93																								
CPA-8 (Retroactive labelling)	2228.96																								
Total	40,434																								

E.3.6.4. Summary of calculation of GHG emission reductions or net GHG removals by sinks

Means of verification	The verification team assessed whether the data and calculations of GHG emission reductions achieved resulting from the project activity. The verification team has checked whether calculations of GHG emission reduction have been carried out in accordance with the formulae and methods described in the registered monitoring plan.
Findings	CL09 was raised in this section.
Conclusion	The verification team analysed all factors and issues that constitute the basis for emission reductions from the project activity for the current monitoring period. The verification team checked the formulae and data used in the emission reduction calculations and confirms that the same are correct. No lack of evidence and missing data were detected during this monitoring period. The verification team confirms that all assumptions, emission factors and default values have been correctly justified. All the emission factors and default values are explicitly mentioned in the monitoring report. According to the registered PoA-DD and registered monitoring plan as explained in sec E.3.5.1 to E.3.5.3 above, no project emissions are associated with the project activity. Therefore, the net emission reductions ER = 768235 tCO_{2e}

Reference number of the CPA	Baseline emissions or baseline net GHG removals by sinks (tCO ₂ e)	Project emissions or actual net GHG removals by sinks (tCO ₂ e)	Leakage (tCO ₂ e)	GHG emission reductions or net GHG removals by sinks (tCO ₂ e)		
				Amount achieved before 1 January 2013	Amount achieved from 1 January 2013	Amount achieved in the entire monitoring period
CPA-1	82,870.80	0	4,143.54	0	78,727	78,727
CPA-2	96,272.60	0	4,813.63	0	91,458	91,458
CPA-3	87,634.63	0	4,381.73	0	83,252	83,252

CPA-4	93,702.72	0	4,685.14	0	89,017	89,017
CPA-5	101,935.45	0	5,096.77	0	96,838	96,838
CPA-6	80,318.31	0	4,015.92	0	76,302	76,302
CPA-7	82,301.41	0	4,115.07	0	78,186	78,186
CPA-8	95,960.01	0	4,798.00	0	91,162	91,162
CPA-9	43,098.57	0	2,154.93	0	40,943	40,943
CPA-8 (Retroactive labeling):	44579.12	0	2228.96	0	42350	42350
Total	808,674	0	40,434	0	768235	768235

E.3.6.5. Comparison of actual GHG emission reductions or net GHG removals by sinks with estimates in included CPA

Means verification	of	The verification team has determined the CER achieved during this monitoring period with the estimated value and reason for increase if any.
Findings		There is no CAR/CL raised in this section.
Conclusion		The total number of ERs achieved during the monitoring period is 768,235 tCO ₂ e. In summary, verification team confirms that actual emission reduction is lower than the estimate of the registered (included)/approved CPA-DD for the current monitoring period. Refer Annex 2 for details.

Title and UNFCCC reference number of the CPA	Actual values achieved by the CPAs during this monitoring period	Value estimated in ex ante calculation in the included CPA-DD(s)
CPA-1	78,730	92918
CPA-2	91,458	99445
CPA-3	83,252	99584
CPA-4	89,017	99686
CPA-5	96,838	98915
CPA-6	76,302	92432
CPA-7	78,186	91870
CPA-8	91,162	96936
CPA-9	40,943	40855
CPA-8 (Retroactive labeling):	42,350	55,190
Total	768,235	867,831

E.3.6.6. Remarks on difference from estimated value in included CPA

Means verification	of	The verification team has determined the CER achieved during this monitoring period with the estimated value and reason for increase if any.
Findings		There is no CAR/CL raised in this section.
Conclusion		The ex-ante determined value is on the higher side in comparison to the actual value, this variation is due to the reported lesser operational status of the bio digesters in all the 9 BUS reports. Since the actual values are less than ex-ante values no further explanations is deemed necessary.

E.3.7. Assessment of reported sustainable development co-benefits

Means verification	of	NA
Findings		NA
Conclusion		NA

E.3.8. Global stakeholder consultation

Means	of	NA
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verification	
Findings	NA
Conclusion	NA

SECTION F. Internal quality control

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After the completion of assessment by the verification team all the relevant documentation is submitted to a qualified, Independent Technical reviewer as part of EPIC" internal quality control system. A Technical reviewer team is appointed to review the draft final verification report (Draft FVR). The comments made by the Technical reviewer team are taken into consideration and incorporated in the final FVR. The technical reviewer team assesses whether all the reporting requirements have been fulfilled and whether all the issues raised were closed satisfactorily by the verification team with justification. The technical review process can also raise issues in this regard which is resolved further by the verification team to the satisfaction of the technical reviewer. The technical reviewer team either accepts or rejects the report made by the verification team. The final report (after resolutions of all findings) is then submitted to the Head-operations for review and approval.

SECTION G. Verification opinion

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EPIC Sustainability Services Private Limited (EPIC) has been contracted by AEPC to undertake the sixth periodic independent verification of the registered CDM programme of activity titled "Nepal Biogas Support Program-PoA" (UNFCCC reference number: 9572). The objectives of this verification are to verify and certify emission reductions reported for programme of activity for the monitoring period of 01/08/2018 to 30/01/2020 (first and last day included) covering CPAs 1 to 9; and to verify that the data reported are complete and transparent.

The verification team determines the conformity of the actual project activity and its operation with the registered project design document. EPIC has, by means of a desk review and an on-site visit, assessed that all physical features of the proposed CDM project activity proposed in the registered PoA-DD and CPA-DDs (CPA 01 to 09) are in place, and that the project participants have operated the CDM project activity as per the registered PoA-DD and CPA-DDs. Thus the verification team has concluded that the project activity was implemented and operated as per registered PoA-DD and CPA-DDs, and that all physical features of the project are in place.

The verification team, based on the site visit and document review, was able to conclude that the project activity has been implemented as per the approved PoA-DD and CPA-DDs. The start date of this monitoring period is 01/08/2018 which is in line with the UNFCCC project webpage considering the end date of the previous monitoring period. The monitoring report for this monitoring period is in compliance with the monitoring plan of the approved PoA-DD and CPA-DDs. The project activity was registered by applying the small scale methodology AMS I-E version 4.0 and the verification was carried out in accordance with the applied methodology. It was confirmed during the site visit that the project activity during the current periodic verification is in accordance with the applicability criteria of the methodology. The management of project participants is responsible for the preparation and reporting of GHG emissions data, and the reported GHG emission reduction on the basis set out within the project monitoring plan.

The development and maintenance of records and reporting procedures in accordance with the monitoring plan, including the calculation and determination of GHG emission reduction from the project is the responsibility of the management of the project. It is the responsibility of EPIC to express an independent GHG verification opinion on the GHG emissions reductions and on the calculation of GHG emission reductions from the project for this monitoring period based on the reported emission reduction in the monitoring Report.

EPIC's verification approach was based on the requirements as defined under the Kyoto Protocol, Marrakech accord, as well as those defined by the CDM Executive board. EPIC's approach was risk-based, drawing on an understanding of the risks associated with reported GHG emissions data and the controls in place to mitigate these. The examination includes assessment of evidence relevant to the amounts and disclosures in relation to the project's GHG emission reductions for this monitoring period. The verification team has planned and performed the work to obtain the information and explanations that is considered necessary to provide sufficient evidence for it to give reasonable assurance that the amount of calculated GHG emission reductions for this monitoring period were fairly stated.

SECTION H. Certification statement

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EPIC Sustainability Services Private Limited (EPIC) has carried out the sixth verification of the emission reductions that have been reported for the PoA titled "Nepal Biogas Support Program PoA" (UNFCCC reference number: 9572), covering CPA 01 to CPA 09 for the 01/08/2018 to 30/01/2020. The project participants are responsible for the collection of data in accordance with the monitoring plan and the reporting of GHG emissions reductions from the project activity.

EPIC takes responsibility for issuance of an independent verification statement on the reported GHG emission reductions from the project activity. The verification was done on the basis of the baseline and monitoring methodology AMS-I E, Version 4.0, the validated PoA-DD and CPA-DD's and the monitoring report, version 04.0 dated 25/06/2020.

The verification included checking whether the provisions of the monitoring methodology and the monitoring plan were consistently and appropriately applied and the collection of evidence supporting the reported data. The emission reductions are calculated correctly and EPIC could certify that the emission reductions from the CDM PoA 9572 "Nepal Biogas Support Program-PoA" during the period 01/08/2018 to 30/01/2020 is 768,235 tonnes of CO₂ equivalent.

Appendix 1. Abbreviations

Abbreviations	Full texts
AEPC	Alternative Energy Promotion Centre BSP Biogas Sector Partnership
BUS	Biogas User Survey
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CER	Certified Emission Reductions
CME	Coordinating Managing Entity
CO ₂	Carbon Dioxide
CO _{2e}	Carbon Dioxide Equivalent
CL	Clarification Request
DOE	Designated Operational Entity
ESSPL	EPIC Sustainability Services Private Limited
FAR	Forward Action Request
GHG	Greenhouse gases
GS	Gold Standard
IPCC	Intergovernmental Panel on Climate Change
MoV	Means of Verification
NA	Not applicable
NRB	Non Renewable Biomass
PCP	Project Cycle Procedure
PDD	Project Design Document
PP	Project Participant
PS	Project Standard
QA/QC	Quality Assurance/Quality Control
SETM	Sustainable Energy and Technology Management P. Ltd.
UNFCCC	United Nations Framework Convention on Climate Change
VVS-PoA	Validation and Verification Standard-Programme of Activities

Appendix 2. Competence of team members and technical reviewers

The following verification team has been assigned to carry out the verification of the project

Name	Dr D Siddaramu	Mr. Sujan Adhikari	Mr. Vijayaraghavan Radhamadhavan
Role	Team Leader Auditor	Host country expert	Technical Reviewer
Competence in relevant sectors	Sector 1 and Sector 13 Sector 1	Sector 1 and Sector 13	Sector 1 and Sector 13
Responsibility	Document review, onsite, DVR preparation, DVR resolution Document review, DVR preparation, DVR resolution, FVR preparation	Document review, onsite, DVR preparation, DVR resolution	Technical Review

Dr. D Siddaramu, is a M.Sc., Ph.D in Environmental Science, with over 17 years of experience. A qualified Clean Development Mechanism (CDM) Lead Auditor, successfully registered more than 30 projects with United Nations Framework Convention on Climate Change (UNFCCC) and Verified Carbon Standard registry (VCS) registry; well versed with both National and International legal regime. Has hands on experience in Environmental Impact Assessment (EIA) studies pertaining to different Ecosystem; monitoring, collection & analyzing environmental samples and conducting socioeconomic surveys; data analysis. He has undergone extensive training on CDM validation and verification and is a qualified auditor in accordance with procedures of EPIC sustainability services Pvt. Ltd.

Mr. Sujan Adhikari, has 10 years of experience working in the field of renewable energy technologies in various capacities. He has been extensively involved in project planning, installation and execution of biogas and solar PV projects. He has served as Energy Head in implementing energy projects such as large size biogas plants and as Project coordinator to design/implement/coordinate waste to energy (biogas), micro-small hydro projects (100kW to 7MW) in Nepal. He has led multi-disciplinary team of Engineers, Sociologists and Environmental experts assigned to conduct pre-feasibility, feasibility studies and design of waste to energy (biogas), hydropower projects. He is a qualified Technical Expert under CDM validation and verification services for Sectoral Scope 1 in accordance with procedures of EPIC Sustainability Services Pvt. Ltd.

Mr. R. Vijayaraghavan holds BE in Mechanical Engineering, M. Tech in Energy Conservation and Management and MBA in Technology Management. He is certified as Energy Auditor by Bureau of Energy Efficiency (BEE), Government of India. He has 15 years of working experience in energy sector including 9 years as validator. He has successfully completed around hundred CDM, VCS/GS projects. He has been qualified as Technical Reviewer for Sectoral Scope 1 and 13.

Appendix 3. Documents reviewed or referenced

No.	Author	Title	References to the document	Provider
1	UNFCCC	Validation and Verification Standard for Programme of activities, Version 2.0	1	UNFCCC
2	GS	Gold Standard for Global Goals (GS4GG) GS Principles and Requirements v1.2, GS Activity Requirements v1.2, GS Product Requirements v1.2	2	GS
3	PP	PoA-DD	3	PP
4	DoE	PoA validation report	4	Third party
5	PP	CPA-DD's (CPA 1 to CPA 9)	5	PP
6	DoE	09 CPA validation reports	6	Third party
7	DoE	Previous MR's and verification reports	7	Third party

8	PP	Initial monitoring report, version01	8	PP
9	UNFCCC	Sampling and surveys for CDM project activities and programmes of activities", version 07.0	9	UNFCCC
10	GS	GS4GG MR template, Version 1.0	10	
11	PP	Contract signed between BSP Nepal and AEPC	11	PP
12	PP	PoA database	12	PP
13	UNFCCC	AMS.I.E version 4.0	13	UNFCCC
14	IPCC	IPCC data base	14	Third party
15	UNFCCC	Default values of fraction of non-renewable biomass for Least Developed Countries and Small Island Developing States (version 01.0) EB 67 Annex 22	15	UNFCCC
16	Third party	Annual biogas users survey / BUS Report 2018/19	16	Third party
17	PP	ER spread sheet	17	PP
18	PP	Final MR, Version 04, 25/06/2020	18	PP
19	UNFCCC	Guideline for sampling and surveys for CDM project activities and programme of activities, version 4.0	19	UNFCCC
20	PP	MoU between households and PP for ownership of GHGs	20	PP
21	Third party	Filled in Questionnaires	21	Third party
22	PP	Document to support Technical life of biogas digesters	22	PP
23	PP	Training records of field staff/enumerators	23	PP

Appendix 4. Clarification requests, corrective action requests and forward action requests

Table 1. Remaining FARs from validation and/or previous verification

FAR ID	01	Section no.	Document Review	Date:17/03/2020
Description of CL				
FAR01 dated 01/08/2019 The digester DGG00471 (Khagendra Kumar Khadka) of CPA-1 in Ilam district, was found to be abandoned during the DoE verification field visit for Monitoring period no: 05, it shall not be accounted for in the ER calculations in the future verifications and it has to be excluded from the CME database at the time of “crediting period renewal”, if the status remains the same at that point of time				
Project participant response				Date: 23/03/2020
During the crediting period renewal of the crediting period of the CPA-1, the digester mentioned in the FAR is removed from the database and mentioned in the approved CPA-DD. Please see footnote 1 of the approved CPA-DD for CPA-1 for 2nd crediting period. Also, this has been excluded from the ER calculation (instead of 20,000 plants in the CPA, only 19,999 plants are accounted. This has been mentioned in the temporary corrections under section B.2.2 of the revised GS MR. Please see the revised MR and ER calculation sheet.				
Documentation provided by project participant				
1. Approved CPA-DD for second crediting period: https://cdm.unfccc.int/ProgrammeOfActivities/cpa_db/3K6X5YZ2MFRPCQDU19TBJ8AL47NSGO/view 2. Revised MR: Clean and Track change 3. Revised ER calculation sheet				
DOE assessment				Date: 31/03/2020
The clarification by PP/CME is acceptable, the digester DGG00471 (Khagendra Kumar Khadka) of CPA-1 in Ilam district is not included in the database and has been excluded from the ER calculation (instead of 20,000 plants in the CPA, only 19,999 plants are accounted). Hence FAR02 is closed.				

FAR ID	02	Section no.	Document Review	Date:17/03/2020
Description of CL				
FAR02 dated 01/08/2019 The provision to capture the status of digestors that are “abandoned or cannot be put back into use” in the user survey questionnaire will be implemented by the CME and it shall be reviewed from the Monitoring period number 7				
Project participant response				Date: 23/03/2020
For the monitoring number 7, this provisioned is clearly mentioned in the section 7; sub-section 3 of the “REQUEST FOR PROPOSALS” document for hiring the third party to conduct the user survey. Please see the “Request for Proposal” published in the AEPC’s website for this particular PoA. For the monitoring number 7, this provisioned is clearly mentioned in the scope of the third party to be hired to conduct the user survey. Please see the “Request for Proposal” published in the AEPC’s website for this particular PoA. This provision is clearly mentioned in the section 7; sub-section 3 of the “REQUEST FOR PROPOSALS” document submitted with this response. Since monitoring period number 7 is only applicable to next verification and does not belongs to this MP, the justification on this in the MR for current monitoring period is not relevant. The response to this FAR is accepted by UNFCCC for the MP-6 verification.				
Documentation provided by project participant				
1. Request for Proposal for Biogas User Survey: SD#1_RFP-Selection of Consulting Services for_ Conducting_Biogas User's Survey 2019_20 for Nepal Biogas Support Programme - PoA.pdf https://www.aepc.gov.np/uploads/docs/rfp-selection-of-consulting-services-for-conducting-biogas-users-survey-201920-for-nepal-biogas-support-programme-poa-1574344282.pdf				

DOE assessment	Date: 31/03/2020
PP/CME has made provision to capture the status of digestors that are “abandoned or cannot be put back into use” in the user survey questionnaire. The user survey questionnaire was checked and found ok, hence FAR02 is closed for this verification. VVB agrees with the PP/CME clarification and agrees that the FAR will be applicable to next verification (i.e., 07th verification) and does not belong to this monitoring period. Hence FAR02 is kept open for the next monitoring period.	

Table 2. CL from this verification

CL ID	01	Section no.	Document Review	Date: 17/03/2020
Description of CL				
PP/CME to clarify, how and on what basis is the the value of operational and non-operational percentage of biogas digestors are arrived.				
Project participant response				Date: 23/03/2020
As mentioned in the registered PoA-DD, the operational status of the biogas digesters are determined through stratified sampling approach. Those sampled households were asked whether the biogas is in continuous operation or not. The surveyor also checks visual looks of the biogas digesters and the stoves whether the stove is burning or not. These parameters determine the operational status. For the non-operational systems, if the digesters is not operational during the survey, that is counted as non-operational systems. As stipulated in the PoA-DD, the stratified sample will be taken for the Terai, Hills and Remote Hills and identified the operational percentage in each stratum. “Guidelines for sampling and surveys for CDM project activities and programme of activities” Annex 5, EB 69” has been referred by the PoA-DD (See annex 4 of the registered PoA-DD for the monitoring period). Using those operational percentage for the strata identified from the survey, the stratified overall proportion for the whole population is calculated using weighted average value of the operational status as specified in para 63 (eq.6) of the “Guidelines for sampling and surveys for CDM project activities and programme of activities” Annex 5, EB 69”. See section E.3 of the monitoring report for detail.				
Documentation provided by project participant				
The Guidelines for sampling and surveys for CDM project activities and programme of activities can be accessed in: https://cdm.unfccc.int/filestorage/r/n/S9J6CIEN84WGU1KQBA2MRFH0ZO5LX3.pdf/eb69_repan05.pdf?t=SF8cTdtcnRnfDB4ZCXR4ZdBpaBweDumUd67				
DOE assessment				Date: 31/03/2020
The clarification by PP/CME on what basis is the the value of operational and non-operational percentage of biogas digestors are arrived is acceptable. The same has been detailed in the registered PoA-DD. Hence CL01 is closed				

CL ID	02	Section no.	Document review	Date: 17/03/2020
Description of CL				
During site visit to biogas user's, following 06 households visited we're not working. 1. HED01812 - Ambika Tamang, Chitwan (checked over phone) and 2. PGG10220 - Sunita Bhujel, Lamjung Now PP to clarify whether this is taken into account in the user survey and ER calculations?				
Project participant response				Date: 23/03/2020
The operational status of the biogas digesters are based on the biogas user survey using stratified random sampling approach as stipulated in PoA-DD (See annex 4 of the registered PoA-DD). As per PoA-DD, CPA wise monitoring is stipulated. The emission reduction calculation for this monitoring period are based on the operational status. The operational % during the monitoring period ranges from 75.71 % in CPA-1 to 95.55 % in CPA-9. These values have been used for the emission reduction calculation. So, PP hereby confirms that the non-operational biogas plants are not considered in the ER calculation conservatively using the principle of sampling and survey.				

Documentation provided by project participant	
The registered PoA-DD applicable for this MP can be accessed in: https://cdm.unfccc.int/filestorage/a/6/T50IO9S41AHCEPL3WVMYXJ8ZRUBGK7.pdf/PoA_DD_31%20jan.pdf?t=Nkt8cTdtczBifDCtnYe8QS4UpGcm7rlEdjRW	
DOE assessment	Date: 31/03/2020
The clarification by PP/CME on the non-working biodigestors and the confirmation that these biodigestors not used for ER calculations is acceptable. Hence CL02 is closed.	

CL ID	03	Section no.	Document review	Date: 17/03/2020
Description of CL				
During the site visit to the individual households, it was observed and confirmed that 1. Few households use LPG as a supplement fuel for cooking in addition to biogas and 2. The availability of biogas is low during cold seasons PP/CME to clarify how this is accounted in the emission reduction calculations				
Project participant response				Date: 23/03/2020
1. From the field visit to the household it was evidenced that the first priority of the Biogas users are always biogas as it is free of cost. The bio-digesters are designed to provide the gas to meet the households' daily needs. In accessible areas, it was found that few household kept the LPG as a Supplement (back-up) when there is some function and required to cook additional food than as usual. Also, though the baseline is non-renewable biomass, CME opted to use default emission factor (81.6 tCO_{2eq}/TJ) given in AMS I.E (version 4) which accounts the 50% coal, 25% Kerosene and 25% LPG (See footnote 1 of the methodology AMS I.E. version 4) rather than using the default emission factor of fuel-wood (which is 112 tCO₂/TJ, See the table 1.4 of 2006 IPCC Guidelines for National Greenhouse Gas Inventories). Since the default value used has already accounted the LPG and use of LPG as a back-up is negligible, it is not accounted separately the use of LPG as back-up during emission reduction calculation. CME is in the opinion that the calculation is conservative. 2. The availability of Biogas is less during cold season. While in the field visit, the people has also mentioned that even in the cold season, their requirement of cooking food for their particular family has been met by the gas which is designed for and the less gas is generally last for only one month. So, for the additional food if they have to cook during the winter, they sometime need alternate fuel for cooking. Since biogas digesters are designed for the cooking food for the family and accordingly "Quantity of woody biomass that is substituted or displaced" is fixed-ex-ante, CME is in the opinion that this has been considered in annual average woody biomass that is substituted or displaced and not necessary to account this event separately while doing emission reduction calculation. Same approach had been followed in last 5 verifications of this PoA.				

Documentation provided by project participant	
1. AMS I.E version 4: https://cdm.unfccc.int/filestorage/M/I/6/MI6Z47XJAVRTKN3BWSQ1Y8FD2E9ULG/EB60_repan20_%20AMS-I.E_ver04.pdf?t=RnV8cTdtczc4fDBzfynmQOXHangbpGktRFtx 2. IPCC Guideline: https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_1_Ch1_Introduction.pdf	
DOE assessment	Date: 31/03/2020
The clarification by PP/CME on the few households using LPG as a supplement fuel for cooking in addition to biogas and on the availability of biogas low during cold seasons on how this is accounted in the emission reduction calculations is accepted. Hence CL03 closed	

CL ID	04	Section no.	Document review	Date: 17/03/2020
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Description of CL	
During the site visit in the areas visited there were biogas installed and operational much earlier than the project, PP to clarify 1. How project HHs are identified & monitored and 2. What is the procedure adopted to avoid double counting	
Project participant response	Date: 23/03/2020
1. As responded in CL 1 above, stratified sampling approach was followed to identify the households under each CPAs. The random sample was taken using "Rand" function in excel to identify the households in each strata. A questionnaire was developed (as did in last 5 monitoring of PoA) and employed to get the data on operational status of biogas plants, confirming the use of non-renewable biomass and other socio-economic and sustainable development parameters related to the CPAs. The enumerators were employed to gather the data from individual households to complete the Biogas User Survey for this monitoring period. Before employing the enumerators, orientation was provided to them to collect and monitoring the data/parameters of interest. Since Biogas User Survey is the main tool for the monitoring for this PoA, Biogas User Survey Report is prepared incorporating the surveyed data. To avoid biasness of the survey, third party consultant was used employed for the survey. 2. The actual information of the digesters and other information are is reflected in the registered database for each CPA and validated by the DOE during inclusion. See the database of all CPAs under UNFCCC link under PoA (9572). To avoid double counting, the name of the biogas owner along with address and the unique dome gas pipe number for the Biogas is provided for each biogas. Since all the biogas digesters are bundled in the CPAs retroactively and also validated by the validating DOE and also verified by the verifying DOE in previous verification, the database provided are unique (with unique ID for each biogas). So, drawing the sample from each CPA avoids the double counting due to already set database and the unique ID of the biogas plants.	
Documentation provided by project participant	
Biogas database for all the CPAs are given in ER calculation sheet for each CPAs which can be accessed in: https://cdm.unfccc.int/ProgrammeOfActivities/poa_db/7BSCYZMH2U05TWXFKELND18PRO960/viewCPAs However, the database of all CPAs is also provided separately as SD#5.	
DOE assessment	Date: 31/03/2020
The clarification by PP/CME on the biogas installed and operational much earlier than the project, how project HHs are identified & monitored and the procedure adopted to avoid double counting is acceptable. Hence CL04 is closed.	

CL ID	05	Section no.	Document review	Date: 17/03/2020
Description of CL				
What are the QA/QC procedures adopted by CME/PP to check the accuracy/effectiveness and conservativeness of the Biogas user survey.				
Project participant response				Date: 23/03/2020
Being a government entity, CME always put its effort to provide the neutral, unbiased and accurate results from the user survey as the outcome of the survey is not only for CDM/GS but to report the socio-economic impacts of Biogas in the society. So, CME carefully starts the process with caution. Before conducting the survey, CME follows competitive process to select appropriate third party consultants for the survey and selection process is very rigorous. After selection of the consultants, CME discuss with the consultant and provides the feedback on questionnaires and jointly involved in orientation to the enumerators. In between, CME keeps close coordination with consultant. Once the draft report is received, few sample households are checked through phone call to know if the information provided in the questionnaires are correct and the visit of the survey team. CME also checks if the survey met the given reliability/precision. In this way, the Biogas User Survey reports are finalized. Same approach has been followed for the previous verification of the PoA.				
Documentation provided by project participant				
N/A				

DOE assessment	Date: 31/03/2020
The QA/QC procedures adopted by CME/PP to check the accuracy/effectiveness and conservativeness of the Biogas user survey conducted is acceptable. Hence CL05 is closed	

CL ID	06	Section no.	Document review	Date: 17/03/2020
Description of CL				
Random review of filled in survey questionnaires reveal that; “the size of digestors, the date of construction, phone number” information in questionnaire are not matching with the PoA database. PP/CME to explain the effectiveness of the QA/QC process followed in relation to conduct of survey and assessment of its results				
Project participant response				Date: 23/03/2020

The information put in the questionnaires are all based on perception of the households using biogas. The actual construction date, size of the digesters and other information are the ones incorporated in the commissioning report which is reflected in the registered database for each CPA and validated by the DOE during inclusion. See the database of all CPAs under UNFCCC link under PoA (9572). Further, the main parameter of interest during monitoring is percentage of digester operational and the confirmation of use of NRB which is visible in the site for calculating the emission reduction and confirming the use of NRB. The emission reduction calculation and the confirmation of NRB in the case of this PoA is not associated with the size of the bio-digester. So, there might be some typo error in filled in survey questionnaire on size and date but this deviation has no any impact on ER calculation and confirmation of NRB for this monitoring period. Before conducting the survey, CME followed competitive process to select appropriate third party for the survey and selection process is very rigorous. After selection of the consultants, CME provides the feedback on questionnaires and jointly involved in orientation to the enumerators. Once the draft report is received, few sample households are contacted to know if the information provided in the questionnaires are correct and the visit of the survey team. CME also checks if the survey met the given reliability/precision. In this way, the Biogas User Survey reports are then finalized. Same approach has been followed for the previous verification of the PoA.

Documentation provided by project participant

Biogas database for all the CPAs are given in ER calculation sheet for each CPAs which can be accessed in: https://cdm.unfccc.int/ProgrammeOfActivities/poa_db/7BSCYZMH2U05TWXFJKELND18PRQ960/viewCPAs
However, the database of all CPAs is also provided separately as SD#5.

DOE assessment	Date: 31/03/2020
The clarification is accepted, hence CL06 is closed	

CL ID	07	Section no.	Document review	Date: 17/03/2020
Description of CL				
Clarify, the value of operational percentage of biogas digestors (i.e., The weighted average operational status of biogas considering the operational % of all strata) of CPA 8 is indicated as 90.16% in MR, but, in the BUS report it is 81.76%.				
Project participant response				Date: 23/03/2020
The weighted average operational status of biogas is calculated considering the operational % of all strata. Actually, the value of operational status of 81.76% is for the CPA-7. If we use the operational data for each stratum of the CPA-8 to calculate the stratified proportion as specified in para. 63 (eq.6) of the “Guidelines for sampling and surveys for CDM project activities and programme of activities” Annex 5, EB 69” gives the result of 90.16%. This has been accurately given in section 3.1 of the Biogas User Survey Report for CPA-8 and same has been used while calculating the emission reduction.				
Documentation provided by project participant				
See SD#3.8 for Biogas User Survey Report of CPA-8				
DOE assessment				Date: 31/03/2020
The clarification is accepted, hence CL07 is closed				

CL ID	08	Section no.	Document review	Date: 17/03/2020
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Description of CL	
During the site visit few HH's did not confirm the user survey and enumerators visit. PP/CME to clarify	
Project participant response	Date: 23/03/2020
For this monitoring period, user survey was done in Feb-March 2019 (almost one year before the field verification). Such response from few households was due to the different family members of the corresponding households as respondent during user survey and the verification field visit now. However, this has no any impact in ER calculation. The ER calculation depends on the monitoring parameters given in the PoA-DD and CPA-DD which are monitored in user survey reports. Furthermore, CME also closely monitors the user survey activity; CME hereby confirms that the data provided are unbiased and real.	
Documentation provided by project participant	
N/A	
DOE assessment	Date: 31/03/2020
The clarification is accepted, hence CL08 is closed	

CL ID	09	Section no.	Document review	Date: 17/03/2020
Description of CL				
As agreed to GS review query, PP/CME to list the monitoring parameters either in percentage or in numeric terms as did during previous verification.				
Project participant response				Date: 23/03/2020
All the monitoring parameters stipulated in VPA-DDs of the CPAs are given in either numeric values or in percentage in the monitoring report. Please see section D.2 of the MR for the reference.				
Documentation provided by project participant				
GS MR (Clean and Trackchnage)				
DOE assessment				Date: 31/03/2020
The clarification is accepted, hence CL09 is closed				

CL ID	10	Section no.	Document review	Date: 17/03/2020
Description of CL				
Under subsection (f) of Section D.3 (page no.27), it is mentioned that “.....Once the draft report was received, AEPC also checked the database against the filled in questionnaire in a sample basis and provided the feedback to the third party for correction and preparation of final report. So, the efforts were made to ensure the quality of data collected, data entry and data analysis for minimizing the data discrepancies.” Clarify				
1. What correction were identified in the filled questionnaires and 2. Was there any correction in the questionnaires of the current monitoring period? If so submit the questionnaires highlighting the portions corrected				
Project participant response				Date: 23/03/2020
1. For the quality assurance/quality control of the survey, this is the standard approach to minimize the inconsistency in the questionnaires filled in by enumerators. But in this monitoring period, no such inconsistency was observed during the review of draft report as this is the sixth periodic survey done for the Biogas PoA. 2. As mentioned above, this is the standard approach to be followed during the survey. No inconsistency was observed in this monitoring period. The sub-section (d) of section D.3 of the MR is corrected appropriately.				
Documentation provided by project participant				
Revised GS MR: Clean and Track change				

DOE assessment				Date: 31/03/2020
The clarification is accepted, hence CL10 is closed				
CL ID	11	Section no.	Document review	Date: 17/03/2020
Description of CL				
PP/CME to clarify on the Grievance addressable mechanism to respond to the stakeholder concerns and to submit the grievances received during the current monitoring period.				
Project participant response				Date: 23/03/2020
The PoA consists of a grievance mechanism and is publicly available in AEPC's website as well both in Nepali and English Language. The notice can be accessed in: https://www.aepc.gov.np/uploads/docs/l-b-b-aa-b-b-1544451317.pdf . The technical issues are addressed by the owners and/or the local companies. Since no any grievances are received, the records are not available for this monitoring period.				
Documentation provided by project participant				
DOE assessment				Date: 31/03/2020
The clarification is accepted, hence CL11 is closed				

Table 3. CAR from this verification

CAR ID	01	Section no.	Document review	Date: 17/03/2020
Description of CAR				
The PP to submit the following records/documents for verification 1) MoU between households and PP for ownership of GHGs^{/20/} 2) User survey documents/records 3) Filled in Questionnaires^{/21/} 4) Biogas data base of all the CPAs 5) Grievance mechanism records (if any)				
Project participant response				Date: 23/03/2020
1) The MoU signed by households for the emission reduction right transfer are attached which is in Nepali (See SD#2_ER Right Transfer Agreement-sales agreement.pdf). 2) User Survey Reports for CPA-1 to CPA-9 are attached (See documents SD#3.1, SD#3.2, SD#3.3, SD#3.4, SD#3.5, SD#3.6, SD#3.7, SD#3.8 and SD#3.9) 3) Sample filled in questionnaires are attached as SD#4 4) Biogas database for all the CPAs are given in ER calculation sheet for each CPAs which can be accessed in: https://cdm.unfccc.int/ProgrammeOfActivities/poa_db/7BSCYZMH2U05TWXFJKELND18PRQ96O/viewCPAs However, the database of all CPAs are also provided separately as SD#5. 5) Since no any grievances are received, the records are not available for this monitoring period.				
Documentation provided by project participant				
-ER Right transfer: SD#2 -Biogas User Survey Reports: SD#3.1, SD#3.2, SD#3.3, SD#3.4, SD#3.5, SD#3.6, SD#3.7, SD#3.8 and SD#3.9 -Sample Filled in questionnaire: SD#4 -Biogas database for all CPAs: SD#5				
DOE assessment				Date: 31/03/2020
The requested documents are submitted, checked and found ok, hence CAR01 is closed				

CAR ID	02	Section no.	Document review	Date: 17/03/2020
Description of CAR				
The PP to submit the following records/documents for verification				
1) Document to support Technical life of biogas digesters ^{/22/} and				
2) Training records of field staff/enumerators ^{/23/}				
Project participant response				Date: 23/03/2020
1. Operational lifetime of the biogas digester is taken as 20 years which is substantiated through a document and is provided with this package. This has been validated by validating DOE during PoA registration and the inclusion of CPAs. This document is in Nepali (Please see page 2, 2 nd Para of SD# 6).				
2. The training records of the enumerators for the survey is given in Biogas User Survey reports. See Annex 2 and Annex 4 of SD#3.1 to SD#3.9).				
Documentation provided by project participant				
DOE assessment				Date: 31/03/2020
The requested documents are submitted, checked and found ok, hence CAR02 is closed				

Table 4. FAR from this verification

FAR ID	NIL	Section No.	Document review	Date: 17/03/2020
Description of FAR				
-				
Project participant response				Date: DD/MM/YYYY
-				
Documentation provided by project participant				
DOE assessment				Date: DD/MM/YYYY
-				

Appendix 5. Total number of households visited CPA wise

District	CPA1	CPA2	CPA3	CPA4	CPA5	CPA6	CPA7	CPA8	CPA9	Total	Eco-zone
Sample Visited											
Dhading	-	-	5	-	-	-	-	-	-	5	HI
Lamjung	-	-	-	4	-	4	-	4	6	18	HI
Tanahun	-	4	-	-	4	-	-	-	-	8	HI
Palpa	-	-	-	-	-	-	4	-	-	4	HI
Kaski	5	-	1	-	-	-	-	-	-	6	HI
Rupandehi	-	-	4	-	-	-	-	4	-	8	TE
Nawalparasi	-	-	-	-	5	2	-	-	-	7	TE
Chitwan	-	-	-	-	1	-	5	-	5	11	TE
Sub-total	5	4	10	4	10	6	9	8	11	67	
Sample Phone Called											
Lamjung	-	-	-	2	-	1	-	-	-	3	HI
Tanahun	-	-	-	-	-	-	-	-	-	0	HI
Nawalparasi	-	7	-	5	-	-	3	-	-	15	TE
Chitwan	5	-	-	-	-	-	-	-	-	5	TE
Makwanpur	-	-	-	-	-	-	-	4	-	4	HI
Parsa	-	-	-	-	-	5	-	-	-	5	TE
Darchula	-	-	-	-	3	-	-	-	-	3	RH
Sankhuwasabha	-	-	-	-	-	1	2	-	3	6	RH
Sub-Total	5	7	0	7	3	7	5	4	3	41	
Total sample covered	10	11	10	11	13	13	14	12	14	108	

Annex 1: Assessment of monitored SDG Indicators:

During the on-site inspections the verification team has randomly selected households (surveyed and non-surveyed) for the 9 CPA's, the number of respondents for all the SDG indicators as discussed below are the same. BUS Survey is carried out as part of the CDM plus GS survey requirement, focussing the carbon and all the SDG related indicators. Survey is done by third party independent entity (Sustainable Energy and Technology Management P. Ltd.) at annual frequency.

SI No.	SDG Indicator	Parameter	Value (from BUS survey)	Assessment on SDG indicators and mitigation measures
1	7.1.2 Proportion of population with primary reliance on clean fuels and technology	P The share of digesters operational	<u>For regular verification (Monitoring period: 01/08/2018-30/01/2020)</u> CPA-1: 75.71% CPA-2: 88.27% CPA-3: 80.22% CPA-4: 85.73% CPA-5: 93.86% CPA-6: 79.31% CPA-7: 81.76% CPA-8: 90.16% CPA-9: 95.55% <u>For retroactive labelling of CPA 8 (Monitoring period: 23/09/2017-31/07/2018)</u> CPA-8: 73.57%	Please refer to sec E.3.4.2 and E.3.4.3 above for detailed assessment of this indicator
2	3.9.1 Mortality rate attributed to household and ambient air pollution	Users perception on reduction in indoor air pollution Reduction in health problem	<u>For regular verification (Monitoring period: 01/08/2018-30/01/2020)</u> CPA-1: 99.03% users perceived reduction CPA-2: 97.46% users perceived reduction CPA-3: 99.06% users perceived reduction CPA-4: 99.13% users perceived reduction CPA-5: 96.85% users perceived reduction CPA-6: 99.07% users perceived reduction CPA-7: 100% users perceived reduction CPA-8: 96.72% users perceived reduction CPA-9: 98.45% users perceived reduction <u>For retroactive labelling of CPA 8 (Monitoring period: 23/09/2017-31/07/2018)</u> CPA-8: 100% users perceived reduction Values are captured for each of the 7 CPAs under the following heads: 1) Eye infection, 2) Respiratory diseases, 3) Cough and 4)	The BUS survey report submitted by the PP is the basis for the reported results. During the on-site inspections the verification team has randomly selected households (surveyed and non-surveyed) for the 9 CPA's, and through interview with the residents and by visual observation it is concluded that the air quality has considerably improved after the implementation of the project activity. Respondents expressed that Smoke, suspended air particles are reduced, incidents of eye irritation, cough are avoided in comparison to the traditional mode of cooking involving firewood. Because of the relatively clean mode of cooking, eye infections and other respiratory related diseases are reduced to a large extent. Since the biogas are piped to the stove and with greater control over the cooking, the instances of fire hazard are minimised. The verification team is convinced that the reported conclusion arrived for the MR period is acceptable

			Fire related injury (refer sec D.2 of MR)	
3	3.9.1 Mortality rate attributed to household and ambient air pollution	Users perception in Time saving for the cooking (reduce exposure to indoor air pollution)	Refer Table A below	During the on-site inspections the verification team has interviewed the randomly selected households for assessing this parameter requirement. All users positively confirmed saving in time compared to baseline scenario. Therefore, the conclusions of the monitoring team are deemed to be correct
4	7.1.2 Proportion of population with primary reliance on clean fuels and technology	Users perception on time saving due to project for firewood collection	Refer Table B below	During the on-site inspections the verification team has interviewed the randomly selected households for assessing this parameter requirement. All users positively confirmed saving in time compared to baseline scenario. Therefore, the conclusions of the monitoring team are deemed to be correct
		Trainings for masons	In this monitoring period, Two Mason (Biogas Technician Level-1) Training was conducted for 75 to maintain the sufficient manpower in the market that will help in promoting biogas technology.	Not applicable, since the biogas digesters of all the 9 CPAs are already implemented, the monitoring of the training to the masons who constructed the digesters is not required. But the training to the mason is provided by AEPC/respective biogas companies etc to the biogas technician. The verification team has reviewed the training reports/30/ and interacted with biogas companies and beneficiaries and attained conformance
5	3.9.3 Mortality rate attributed to unintentional poisoning	Users" perception on reduction in use of chemical fertilizers and use of bioslurry	Refer Table C below	All the respondents of the household confirmed that the slurry is used as fertiliser (organic manure) in their own farm, and the productivity of the crop has increased considerably. And the marginal farmers and those who does not own the farm land the slurry is sold. During site visit, the verification team has visually checked the application of slurry as manure to the farm land. It is also observed the slurry is used as manure at the frequency ranging from 3 to 6 months. The use of chemical fertiliser is on reducing trend due to the application of bioslurry
	4.3.8 Safeguarding Principle	Impact on Crop Productivity	<u>For regular verification (Monitoring period: 01/08/2018-30/01/2020)</u> <u>% users perceived in increase in productivity due to bio-slurry use from Biogas:</u> CPA-1: 69.90% CPA-2: 83.90% CPA-3: 72.38% CPA-4: 76.52% CPA-5: 75.59% CPA-6: 75.70% CPA-7: 80.18% CPA-8: 90.16% CPA-9: 75.19%	

			<u>For retroactive labelling of CPA 8 (Monitoring period: 23/09/2017-31/07/2018)</u> % users perceived in increase in productivity due to bio-slurry use from Biogas: 73%	
6	3.9.2 Mortality rate attributed to unsafe water, unsafe sanitation and lack of hygiene (exposure to unsafe Water, Sanitation and Hygiene for All (WASH) services)	Improved access to sanitation services	<u>For regular verification (Monitoring period: 01/08/2018-30/01/2020)</u> <u>Connection of toilet with biogas:</u> CPA-1: 76.70% CPA-2: 78.81% CPA-3: 84.91% CPA-4: 91.30% CPA-5: 86.61% CPA-6: 90.65% CPA-7: 71.17% CPA-8: 85.25% CPA-9: 82.17% <u>For retroactive labelling of CPA 8 (Monitoring period: 23/09/2017-31/07/2018)</u> Connection of toilet with biogas CPA-8: 99%	It was observed that the users without toilet access initially, preferred to have the toilet constructed along the biogas digesters. Those users that had existing toilet facility had their facility connected to the digesters, wherever it was technically feasible for the construction. It was also observed that connection of the toilet with the digesters is related to cultural and societal belief. In general it is accepted that the sanitation level of the users has improved by the project activity

The verification team confirms that no changes to the validated SDG parameters have occurred that may have an impact on Gold Standard qualification of this project activity. It is also further confirmed that the project has achieved the mitigation/compensation measures as per the validated monitoring plan.

Table A: Showing Users' perception on reduction in health problem

For regular verification (Monitoring period: 01/08/2018-30/01/2020)

CPAs	% HH perceived reduction in			
	Eye infection	Respiratory diseases	Cough	Fire related injury
CPA-1	83.50	85.44	82.52	80.58
CPA-2	97.46	88.14	81.36	83.90
CPA-3	82.08	66.98	77.36	74.53
CPA-4	80.87	91.30	73.91	76.52
CPA-5	95.28	87.40	89.76	89.76
CPA-6	94.39	93.46	91.59	93.46
CPA-7	98.20	92.79	93.69	92.79
CPA-8	99.18	92.62	83.61	92.62
CPA-9	95.35	95.35	94.57	93.02

For retroactive labelling of CPA 8 (Monitoring period: 23/09/2017-31/07/2018)

Reduction in eye infection: 70 % households

Reduction in respiratory disease: 76% households

Reduction in Cough: 98 % households

Reduction in fire related injury: 97% households

Table B: Showing Users' perception on time saving for cooking due to project

For regular verification (Monitoring period: 01/08/2018-30/01/2020)

Reduction in time for cooking food (perception)

CPAs	% HH perceived reduction in cooking time for
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	Men	Women	Children
CPA-1	26.21	93.20	19.42
CPA-2	20.34	98.31	5.93
CPA-3	47.17	97.17	0.94
CPA-4	26.27	94.92	7.63
CPA-5	11.02	96.85	13.39
CPA-6	22.43	100	1.87
CPA-7	25.23	97.30	2.70
CPA-8	13.11	100	15.57
CPA-9	21.71	98.45	5.43

For retroactive labelling of CPA 8 (Monitoring period: 23/09/2017-31/07/2018)

Reduction in cooking time of men: 62 % households

Reduction in cooking time of women: 99 % households

Reduction in cooking time of children: 18 % households

Table C: Showing Users perception in reduction of chemical fertilizers

For regular verification (Monitoring period: 01/08/2018-30/01/2020)

Reduction in chemical fertilizer used and use of bio-slurry

CPAs	% changes in use of chemical fertilizers and increase in use of bio-slurry				
	Farm Yard Manure	Bio-slurry	Urea	DAP	Potash
CPA-1	-26.50	100	-26.83	-22.50	-40.0
CPA-2	-27.36	100	-28.57	-55.56	-83.33
CPA-3	-36.92	100	-43.59	-36	0
CPA-4	-25.79	100	-15.38	-5.88	-100
CPA-5	-37.12	100	-40	-13.33	-25
CPA-6	-40.71	100	-44.07	-25	-100
CPA-7	-36.86	718	-33.33	-2.86	0
CPA-8	-39.84	100	-45.45	-15.38	0
CPA-9	-32.03	100	-46.15	-25.93	-50

For retroactive labelling of CPA 8 (Monitoring period: 23/09/2017-31/07/2018)

Changes in use of Farm Yard manure: -98%

Changes in use of Bio-slurry: 100 %

Changes in use of Urea: -23 %

Changes in use of DAP: -28 %

Changes in use of Potash: -22 %

Grievances Mechanism

The CME has given telephone numbers of the AEPC office (toll free no) and the relevant stakeholders such as biogas promoters association central and regional offices to contact directly and record their grievances. Also in APEC website a provision for online contact and complaint logging is available and the contact information of the officials concerned is given. During the site visit the households indicated that during the warranty period the biogas companies were responsible for repair works and attended well. Usually majority of the grievances were minor repair works (eg-knob failure, worn out/corrosion of the burner) which were attended in First in First Out basis by the local trained personnel along with the spare parts. No grievance existed from previous monitoring period that required further follow-up action, also interview with the CME management and the sampled household conform that No legal disputes/contest has arisen during the current monitoring period. Thus it can be conformed that the CME is having a grievance addressable mechanism to respond to the stakeholders concern. The validation team has interviewed some of the local stakeholders and found that they are aware of grievance mechanism (how to contact, whom to contact), and there was no grievances faced by them.

Annex 2 Summary of ex-post values of each SDG outcome for the current monitoring period

Item	Baseline estimate	Project estimate	Net benefit																																																																																																																																																				
SDG 3	0% users percept reduction in indoor air pollution	Regular verification: CPA-1: 99.03% users perceived reduction CPA-2: 97.46% users perceived reduction CPA-3: 99.06% users perceived reduction CPA-4: 99.13% users perceived reduction CPA-5: 96.85% users perceived reduction CPA-6: 99.07% users perceived reduction CPA-7: 100% users perceived reduction CPA-8: 96.72% users perceived reduction CPA-9: 98.45% users perceived reduction Retroactive labelling: CPA-8: 100% users perceived reduction	Regular verification: CPA-1: 99.03% CPA-2: 97.46% CPA-3: 99.06% CPA-4: 99.13% CPA-5: 96.85% CPA-6: 99.07% CPA-7: 100% CPA-8: 96.72% CPA-9: 98.45% Retroactive labelling: CPA-8: 100%																																																																																																																																																				
	0% users percept the reduction in different health problem	<table><tr><td colspan="5">Table showing Project estimate</td></tr><tr><th rowspan="2">CPAs</th><th colspan="4">% HH perceived reduction in</th></tr><tr><th>Eye infection</th><th>Respiratory</th><th>Cough</th><th>Fire related</th></tr><tr><td colspan="5">Regular</td></tr><tr><td>CPA-1</td><td>83.50</td><td>85.44</td><td>82.52</td><td>80.58</td></tr><tr><td>CPA-2</td><td>97.46</td><td>88.14</td><td>81.36</td><td>83.90</td></tr><tr><td>CPA-3</td><td>82.08</td><td>66.98</td><td>77.36</td><td>74.53</td></tr><tr><td>CPA-4</td><td>80.87</td><td>91.30</td><td>73.91</td><td>76.52</td></tr><tr><td>CPA-5</td><td>95.28</td><td>87.40</td><td>89.76</td><td>89.76</td></tr><tr><td>CPA-6</td><td>94.39</td><td>93.46</td><td>91.59</td><td>93.46</td></tr><tr><td>CPA-7</td><td>98.20</td><td>92.79</td><td>93.69</td><td>92.79</td></tr><tr><td>CPA-8</td><td>99.18</td><td>92.62</td><td>83.61</td><td>92.62</td></tr><tr><td>CPA-9</td><td>95.35</td><td>95.35</td><td>94.57</td><td>93.02</td></tr><tr><td colspan="5">Retroactive</td></tr><tr><td>CPA-8</td><td>70.00</td><td>76.00</td><td>98.00</td><td>97.00</td></tr></table> <table><tr><td colspan="5">Table showing Net benefit</td></tr><tr><th rowspan="2">CPAs</th><th colspan="4">% HH perceived reduction in</th></tr><tr><th>Eye infection</th><th>Respiratory</th><th>Cough</th><th>Fire related</th></tr><tr><td colspan="5">Regular</td></tr><tr><td>CPA-1</td><td>83.50</td><td>85.44</td><td>82.52</td><td>80.58</td></tr><tr><td>CPA-2</td><td>97.46</td><td>88.14</td><td>81.36</td><td>83.90</td></tr><tr><td>CPA-3</td><td>82.08</td><td>66.98</td><td>77.36</td><td>74.53</td></tr><tr><td>CPA-4</td><td>80.87</td><td>91.30</td><td>73.91</td><td>76.52</td></tr><tr><td>CPA-5</td><td>95.28</td><td>87.40</td><td>89.76</td><td>89.76</td></tr><tr><td>CPA-6</td><td>94.39</td><td>93.46</td><td>91.59</td><td>93.46</td></tr><tr><td>CPA-7</td><td>98.20</td><td>92.79</td><td>93.69</td><td>92.79</td></tr><tr><td>CPA-8</td><td>99.18</td><td>92.62</td><td>83.61</td><td>92.62</td></tr><tr><td>CPA-9</td><td>95.35</td><td>95.35</td><td>94.57</td><td>93.02</td></tr><tr><td colspan="5">Retroactive</td></tr><tr><td>CPA-8</td><td>70.00</td><td>76.00</td><td>98.00</td><td>97.00</td></tr></table>		Table showing Project estimate					CPAs	% HH perceived reduction in				Eye infection	Respiratory	Cough	Fire related	Regular					CPA-1	83.50	85.44	82.52	80.58	CPA-2	97.46	88.14	81.36	83.90	CPA-3	82.08	66.98	77.36	74.53	CPA-4	80.87	91.30	73.91	76.52	CPA-5	95.28	87.40	89.76	89.76	CPA-6	94.39	93.46	91.59	93.46	CPA-7	98.20	92.79	93.69	92.79	CPA-8	99.18	92.62	83.61	92.62	CPA-9	95.35	95.35	94.57	93.02	Retroactive					CPA-8	70.00	76.00	98.00	97.00	Table showing Net benefit					CPAs	% HH perceived reduction in				Eye infection	Respiratory	Cough	Fire related	Regular					CPA-1	83.50	85.44	82.52	80.58	CPA-2	97.46	88.14	81.36	83.90	CPA-3	82.08	66.98	77.36	74.53	CPA-4	80.87	91.30	73.91	76.52	CPA-5	95.28	87.40	89.76	89.76	CPA-6	94.39	93.46	91.59	93.46	CPA-7	98.20	92.79	93.69	92.79	CPA-8	99.18	92.62	83.61	92.62	CPA-9	95.35	95.35	94.57	93.02	Retroactive					CPA-8	70.00	76.00	98.00	97.00
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	0% users perceived the time saving for cooking for women due to biogas that reduce the exposure to indoor air pollution	Regular verification: CPA-1: 93.20% CPA-2: 98.31% CPA-3: 97.17% CPA-4: 94.92% CPA-5: 96.85% CPA-6: 100% CPA-7: 97.30% CPA-8: 100% CPA-9: 98.45% Retroactive labeling CPA-8: 99%	Regular verification: CPA-1: 93.20% CPA-2: 98.31% CPA-3: 97.17% CPA-4: 94.92% CPA-5: 96.85% CPA-6: 100% CPA-7: 97.30% CPA-8: 100% CPA-9: 98.45% Retroactive labeling CPA-8: 99%
	0% increase in use of bio-slurry and reduction in chemical fertilizers	100% increase in bio-slurry use and decrease in chemical fertilizer use	100% increase in bio-slurry use and decrease in chemical fertilizer use
	0% connection of toilets with biogas	Regular verification: CPA-1: 76.70% CPA-2: 78.81% CPA-3: 84.91% CPA-4: 91.30% CPA-5: 86.61% CPA-6: 90.65% CPA-7: 71.17% CPA-8: 85.25% CPA-9: 82.17% Retroactive labeling CPA-8: 99%	Regular verification: CPA-1: 76.70% CPA-2: 78.81% CPA-3: 84.91% CPA-4: 91.30% CPA-5: 86.61% CPA-6: 90.65% CPA-7: 71.17% CPA-8: 85.25% CPA-9: 82.17% Retroactive labeling CPA-8: 99%
SDG 7	0% users with primary reliance on clean fuels and technologies	Regular verification: CPA-1: 75.71% CPA-2: 88.27% CPA-3: 80.22% CPA-4: 85.73% CPA-5: 93.86% CPA-6: 79.31% CPA-7: 81.76% CPA-8: 90.16% CPA-9: 95.55% Retroactive labeling CPA-8: 73.57%	Regular verification: CPA-1: 75.71% CPA-2: 88.27% CPA-3: 80.22% CPA-4: 85.73% CPA-5: 93.86% CPA-6: 79.31% CPA-7: 81.76% CPA-8: 90.16% CPA-9: 95.55% Retroactive labeling CPA-8: 73.57%
	0% households perceived the time saving for firewood collection of women due to biogas (increasing the access to clean fuel)	Regular verification: CPA-1: 94.17% CPA-2: 97.46% CPA-3: 92.45% CPA-4: 94.92% CPA-5: 98.43% CPA-6: 99.07% CPA-7: 97.30% CPA-8: 100% CPA-9: 97.67% Retroactive labeling CPA-8: 100%	Regular verification: CPA-1: 94.17% CPA-2: 97.46% CPA-3: 92.45% CPA-4: 94.92% CPA-5: 98.43% CPA-6: 99.07% CPA-7: 97.30% CPA-8: 100% CPA-9: 97.67% Retroactive labeling CPA-8: 100%
	0 Masons got training to promote biogas plants	75 Mason got training	75 mason got training

SDG 13	CPA-1: 82870.80 tCO ₂ e CPA-2: 96272.60 tCO ₂ e CPA-3: 87634.63 tCO ₂ e CPA-4: 93702.72 tCO ₂ e CPA-5: 101935.45 tCO ₂ e CPA-6: 80318.31 tCO ₂ e CPA-7: 82301.41 tCO ₂ e CPA-8: 95960.01 tCO ₂ e CPA-9: 43098.57 tCO ₂ e	CPA-1: 4143.54 tCO ₂ e CPA-2: 4813.63 tCO ₂ e CPA-3: 4381.73 tCO ₂ e CPA-4: 4685.14 tCO ₂ e CPA-5: 5096.77 tCO ₂ e CPA-6: 4015.92 tCO ₂ e CPA-7: 4115.07 tCO ₂ e CPA-8: 4798.00 tCO ₂ e CPA-9: 2154.93 tCO ₂ e	CPA-1: 78727 tCO ₂ eq CPA-2: 91458 tCO ₂ eq CPA-3: 83252 tCO ₂ eq CPA-4: 89017 tCO ₂ eq CPA-5: 96838 tCO ₂ eq CPA-6: 76302 tCO ₂ eq CPA-7: 78186 tCO ₂ eq CPA-8: 91162 tCO ₂ eq CPA-9: 40943 tCO ₂ eq
	CPA-8 (Retroactive labeling): 44579.12 tCO ₂ eq Total: 808,674 tCO₂e	CPA-8 (Retroactive labeling): 2228.96 tCO ₂ eq Total: 40,434 tCO₂e	CPA-8 (Retroactive labeling): 42350 tCO ₂ eq Total: 768235 tCO₂e

Comparison of actual value of outcomes with estimates in approved PDD

Item	Values estimated in ex ante calculation of approved PDD	Actual values achieved during this monitoring period				
SDG 3	100% users percept the reduction in different health problem (For all CPAs)	CPAs	% HH perceived reduction in			
			Eye infection	Respiratory Disease	Cough	Fire related
		Regular				
		CPA-1	83.50	85.44	82.52	80.58
		CPA-2	97.46	88.14	81.36	83.90
		CPA-3	82.08	66.98	77.36	74.53
		CPA-4	80.87	91.30	73.91	76.52
		CPA-5	95.28	87.40	89.76	89.76
		CPA-6	94.39	93.46	91.59	93.46
		CPA-7	98.20	92.79	93.69	92.79
		CPA-8	99.18	92.62	83.61	92.62
		CPA-9	95.35	95.35	94.57	93.02
		Retroactive				
		CPA-8	70.00	76.00	98.00	97.00
	100% users perceived the time saving for cooking for women due to biogas that reduce the exposure to indoor air pollution (for all CPAs)	Regular verification: CPA-1: 93.20% CPA-2: 98.31% CPA-3: 97.17% CPA-4: 94.92% CPA-5: 96.85% CPA-6: 100% CPA-7: 97.30% CPA-8: 100% CPA-9: 98.45% Retroactive labeling CPA-8: 99%				
	100% increase in use of bio-slurry and reduction in chemical fertilizers	100% increase in bio-slurry use and decrease in chemical fertilizer use				

	100% connection of toilets with biogas	Regular verification: CPA-1: 76.70% CPA-2: 78.81% CPA-3: 84.91% CPA-4: 91.30% CPA-5: 86.61% CPA-6: 90.65% CPA-7: 71.17% CPA-8: 85.25% CPA-9: 82.17% Retroactive labeling CPA-8: 99%
SDG 7	100% users with primary reliance on clean fuels and technologies	Regular verification: CPA-1: 75.71% CPA-2: 88.27% CPA-3: 80.22% CPA-4: 85.73% CPA-5: 93.86% CPA-6: 79.31% CPA-7: 81.76% CPA-8: 90.16% CPA-9: 95.55% Retroactive labeling CPA-8: 73.57%
	100% households perceived the time saving for firewood collection of women due to biogas (increasing the access to clean fuel)	Regular verification: CPA-1: 94.17% CPA-2: 97.46% CPA-3: 92.45% CPA-4: 94.92% CPA-5: 98.43% CPA-6: 99.07% CPA-7: 97.30% CPA-8: 100% CPA-9: 97.67% Retroactive labeling CPA-8: 100%
	0 Masons got training to promote biogas plants	75 Mason got training
SDG 13	Regular verification: CPA-1: 61,889 tCO₂eq CPA-2: 66,236 tCO₂eq CPA-3: 66,329 tCO₂eq CPA-4: 66,397 tCO₂eq CPA-5: 65,883 tCO₂eq CPA-6: 61,565 tCO₂eq CPA-7: 61,919 tCO₂ CPA-8: 64,565 tCO₂eq CPA-9: 57,134 tCO₂eq Retroactive labeling CPA-8: 64,565 tCO₂eq	Regular verification: CPA-1: 78,727 tCO₂eq CPA-2: 91,458 tCO₂eq CPA-3: 83,252 tCO₂eq CPA-4: 89,017 tCO₂eq CPA-5: 96,838 tCO₂eq CPA-6: 76,302 tCO₂eq CPA-7: 78,186 tCO₂ CPA-8: 91,162 tCO₂eq CPA-9: 40,943 tCO₂eq Retroactive labeling CPA-8: 42,350 tCO₂eq

**Vintage wise Emission Reduction
Regular Verification**

CPA	2018	2019	2020	Total
CPA-1	21980	52437	4310	78727
CPA-2	25535	60917	5006	91458
CPA-3	23244	55451	4557	83252
CPA-4	24853	59290	4874	89017
CPA-5	27037	64500	5301	96838
CPA-6	21303	50821	4178	76302
CPA-7	21829	52076	4281	78186
CPA-8	25452	60720	4990	91162
CPA-9	0	36237	4706	40943
Total	191233	492449	42203	725885

Retroactive labelling

CPA	2017	2018	Total
CPA-8 (labeling)	13573	28777	42350
Total	13573	28777	42350

Remarks on difference from estimated value in approved PDD

The verification team checked the ER calculation sheet for the emission reduction achieved during the monitoring period and concludes that the emission reduction calculations are based on the operation of the biogas digester and the calorific value of woody biomass. So, the reasons for the differences from estimated values for each CPAs are detailed below. The verification teams accepted the same.

CPA-1:

For the CPA-1, ex-ante annual estimate for the emission reduction is 61,889 tCO₂eq which was estimated based on the operational status of 93.3% and the net calorific value of the woody biomass as 0.015 TJ/tonne. During this monitoring period (548 days), the operational status of the CPA-1 is found as 75.71% and the actual value of the net calorific value for the woody biomass is 15.6 TJ/Gg (i.e. 0.0156 TJ/Tonne) is taken as per the IPCC guideline as stipulated in PDD. The calculation for corresponding ex-ante estimate for the monitoring period is 92,918 tCO₂eq whereas the emission reduction achieved is 78,727 tCO₂eq. So, the reduction in achieved value is due to the lower operational status than the value used in ex-ante calculation. For other SDGs, as the survey was based on the perception, the deviation was found accordingly. The value achieved for this monitoring period is higher than the annual estimate given in PDD due to the longest monitoring period (more than 1 year).

CPA-2:

For the CPA-2, ex-ante annual estimate for the emission reduction is 66,236 tCO₂eq which was estimated based on the operational status of 99.8% and the net calorific value of the woody biomass as 0.015 TJ/tonne. During this monitoring period (548 days), the operational status of the CPA-2 is found as 88.27% and the actual value of the net calorific value for the woody biomass is 15.6 TJ/Gg (i.e. 0.0156 TJ/Tonne) is taken as per the IPCC guideline as stipulated in PDD. The calculation for corresponding ex-ante estimate for the monitoring period is 99,445 tCO₂eq whereas the emission reduction achieved is 91,458 tCO₂eq. So, the reduction in achieved value is due to the lower operational status than the value used in ex-ante calculation. For other SDGs, as the survey was based on the perception, the deviation was found accordingly. The value achieved for this monitoring period is higher than the annual estimate given in PDD due to the longest monitoring period (more than 1 year).

CPA-3:

For the CPA-3, ex-ante annual estimate for the emission reduction is 66,329 tCO₂eq which was estimated based on the operational status of 99.8% and the net calorific value of the woody biomass as 0.015 TJ/tonne. During this monitoring period (548 days), the operational status of the CPA-3 is found as 80.22% and the actual value of the net calorific value for the woody biomass is 15.6 TJ/Gg (i.e. 0.0156 TJ/Tonne) is taken as per the IPCC guideline as stipulated in PDD. The calculation for corresponding ex-ante estimate for the monitoring period is 99,584 tCO₂eq whereas the emission reduction achieved is 83,252 tCO₂eq. So, the

reduction in achieved value is due to the lower operational status than the value used in ex-ante calculation. For other SDGs, as the survey was based on the perception, the deviation was found accordingly. The value achieved for this monitoring period is higher than the annual estimate given in PDD due to the longest monitoring period (more than 1 year).

CPA-4:

For the CPA-4, ex-ante annual estimate for the emission reduction is 66,397 tCO₂eq which was estimated based on the operational status of 99.8% and the net calorific value of the woody biomass as 0.015 TJ/tonne. During this monitoring period (548 days), the operational status of the CPA-4 is found as 85.73% and the actual value of the net calorific value for the woody biomass is 15.6 TJ/Gg (i.e. 0.0156 TJ/Tonne) is taken as per the IPCC guideline as stipulated in PDD. The calculation for corresponding ex-ante estimate for the monitoring period is 99,686 tCO₂eq whereas the emission reduction achieved is 89,017 tCO₂eq. So, the reduction in achieved value is due to the lower operational status than the value used in ex-ante calculation. For other SDGs, as the survey was based on the perception, the deviation was found accordingly. The value achieved for this monitoring period is higher than the annual estimate given in PDD due to the longest monitoring period (more than 1 year).

CPA-5:

For the CPA-5, ex-ante annual estimate for the emission reduction is 65,883 tCO₂eq which was estimated based on the operational status of 99.8% and the net calorific value of the woody biomass as 0.015 TJ/tonne. During this monitoring period (548 days), the operational status of the CPA-5 is found as 93.86 % and the actual value of the net calorific value for the woody biomass is 15.6 TJ/Gg (i.e. 0.0156 TJ/Tonne) is taken as per the IPCC guideline as stipulated in PDD. The calculation for corresponding ex-ante estimate for the monitoring period is 98,915 tCO₂eq whereas the emission reduction achieved is 96,838 tCO₂eq. So, the reduction in achieved value is due to the lower operational status than the value used in ex-ante calculation. For other SDGs, as the survey was based on the perception, the deviation was found accordingly. The value achieved for this monitoring period is higher than the annual estimate given in PDD due to the longest monitoring period (more than 1 year).

CPA-6:

For the CPA-6, ex-ante annual estimate for the emission reduction is 61,565 tCO₂eq which was estimated based on the operational status of 99.8% and the net calorific value of the woody biomass as 0.015 TJ/tonne. During this monitoring period (548 days), the operational status of the CPA-6 is found as 79.31 % and the actual value of the net calorific value for the woody biomass is 15.6 TJ/Gg (i.e. 0.0156 TJ/Tonne) is taken as per the IPCC guideline as stipulated in PDD. The calculation for corresponding ex-ante estimate for the monitoring period is 92,432 tCO₂eq whereas the emission reduction achieved is 76,302 tCO₂eq. So, the reduction in achieved value is due to the lower operational status than the value used in ex-ante calculation. For other SDGs, as the survey was based on the perception, the deviation was found accordingly. The value achieved for this monitoring period is higher than the annual estimate given in PDD due to the longest monitoring period (more than 1 year).

CPA-7:

For the CPA-7, ex-ante annual estimate for the emission reduction is 61,191 tCO₂eq which was estimated based on the operational status of 99.8% and the net calorific value of the woody biomass as 0.015 TJ/tonne. During this monitoring period (548 days), the operational status of the CPA-7 is found as 81.76 % and the actual value of the net calorific value for the woody biomass is 15.6 TJ/Gg (i.e. 0.0156 TJ/Tonne) is taken as per the IPCC guideline as stipulated in PDD. The calculation for corresponding ex-ante estimate for the monitoring period is 91,870 tCO₂eq whereas the emission reduction achieved is 78,186 tCO₂eq. So, the reduction in achieved value is due to the lower operational status than the value used in ex-ante calculation. For other SDGs, as the survey was based on the perception, the deviation was found accordingly. The value achieved for this monitoring period is higher than the annual estimate given in PDD due to the longest monitoring period (more than 1 year).

CPA-8:

For the CPA-8, ex-ante annual estimate for the emission reduction is 64,565 tCO₂eq which was estimated based on the operational status of 99.8% and the net calorific value of the woody biomass as 0.015 TJ/tonne. The values are monitored for the CPA-8 for two consecutive monitoring periods. For the retroactive labelling of the CERs issued MP-5 of PoA, the monitoring period of 312 days only is taken and the operational status for that period was found as 73.57% and the actual value of the net calorific value for the woody biomass is 15.6 TJ/Gg (i.e. 0.0156 TJ/Tonne) is taken as per the IPCC guideline as stipulated in PDD. The calculation for corresponding ex-ante estimate for the monitoring period is 55,190 tCO₂eq whereas the emission reduction achieved is 42,350 tCO₂eq. So, the reduction in achieved value is due to

the lower operational status than the value used in ex-ante calculation. Also, the monitoring period considered is less than one year, the achieved value is lower than the annual estimate given in PDD.

For the monitoring period 6 (MP-6) of the PoA, the monitoring period covers 548 days. The operational status of the CPA-8 during this period is found as 90.16 % and the actual value of the net calorific value for the woody biomass is 15.6 TJ/Gg (i.e. 0.0156 TJ/Tonne) is taken as per the IPCC guideline as stipulated in PDD. The calculation for corresponding ex-ante estimate for the monitoring period is 96,936 tCO₂eq whereas the emission reduction achieved is 91,162 tCO₂eq. So, the reduction in achieved value is due to the lower operational status than the value used in ex-ante calculation. For other SDGs, as the survey was based on the perception, the deviation was found accordingly. The value achieved for this monitoring period is higher than the annual estimate given in PDD due to the longest monitoring period (more than 1 year).

CPA-9:

For the CPA-9, ex-ante annual estimate for the emission reduction is 57,134 tCO₂eq which was estimated based on the operational status of 99.8% and the net calorific value of the woody biomass as 0.015 TJ/tonne. During this monitoring period (261 days), the operational status of the CPA-9 is found as 95.55 %. The calculation for corresponding ex-ante estimate for the monitoring period is 40,855 tCO₂eq whereas the emission reduction achieved is 40,943 tCO₂eq. The emission reduction achieved during the monitoring period is higher than the ex-ante value calculated for the monitoring period even the monitored operational percentage is slightly lower than the assumed operational percentage for ex-ante calculation. The main reason is the use of updated value of the calorific value for the non-renewable biomass as per the approved PoA-DD. Page 24 of the registerd PoA-DD mentioned the use of up-to-date value as per IPCC guideline for the calculation. The net calorific value used for the ex-ante calculation was 0.015 TJ/tonne whereas the actual value of the net calorific value for the woody biomass is 15.6 TJ/Gg (i.e., 0.0156 TJ/Tonne). This value has been updated in the methodology AMS I.E version 8 (see para 14 of the AMS I.E version 8 for the reference). So, due to the use of calorific value of 0.0156 TJ/tonne instead of 0.015 TJ/tonne for this monitoring period, the ER value is slightly higher than ex-ante for CPA-9. This is in-line with the registered PoA-DD. For other SDGs, as the survey was based on the perception, the deviation was found accordingly. However, the total emission reduction for the monitoring period is lower than the annual estimate given in PDD as the monitoring period is less than one year.

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Document information

<i>Version</i>	<i>Date</i>	<i>Description</i>
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